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ABSTRACT

This annual report presents several articles related to the work of the Clinical Center for Child Development at Hokkaido University in Sapporo, Japan. The articles are: (1) "Maternal Speech and Behavior during Mother-Infant Play: Comparison between the United States and Japan" (Sueko Toda, Marc H. Bornstein, and Hiroshi Azuma); (2) "The Effects of Tempo and Pitch on the Judgement of Infant Cries" (Taeko Tsukamoto); (3) "Bilingual Children's Language Choice in Two Linguistic Contexts" (Hiroko Kasuya); (4) "Sex Education in Children and Children's Fantasy about Sexuality" (Takashi Tsubakita); (5) "Development of Parental Aversion to Offspring's Bodily Products: A New Approach to Parent- Offspring Relationships" (Ko'ichi Negayama); (6) "Feeding as a Communication Between Mother and Infant in Japan and Scotland" (Ko'ichi Negayama); and (7) "Tanshinfunin: Effects of Father Absence on Children's Socioemotional Development" (Jun Nakazawa, Yuko Tanaka, and Sayuri Nakazawa). (KB)

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Shing-Jen Chen,
Takashi Furutsuka, Yukari Shirotani
With Assistance of Yumiko Sekino

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MATERNAL SPEECH AND BEHAVIOR DURING MOTHER-INFANT PLAY: COMPARISON BETWEEN THE UNITED STATES AND JAPAN

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Abstract

The present study investigated cultural characteristics of maternal speech and behaviors during mother-infant play. Forty-four 13-month-old infants and their mothers were recruited in the Unites States and Japan and observed at their homes. The results showed that American mothers emphasized labeling objects, talking about infants' activities and states, and encouraged infants, by giving, showing, and pointing an object more than their Japanese counterparts; whereas, Japanese mothers emphasized social routines and empathy, by showing the model and gesturing. Mothers' behaviors were less than speech in frequency; however, most speech entailed behaviors so that infants can easily understand what mothers say. Findings suggest that American culture emphasizes language and self development and Japanese culture emphasizes social and emotional development. The studies of maternal speech and behaviors have been done from the view point of language development and further research is needed to investigate the relationship between maternal speech and behaviors and child language and social development.

Key Words: maternal speech and behavior, mother-infant play, language, social routine, development, cultural comparison.

Introduction

In the beginning of the second year, infants begin to produce single-word utterances and mothers become aware of infant language comprehension and production. In the pre-linguistic period, maternal speech is characterized as unclear, short, simple, baby-centered utterances, frequent repetitions, and exaggerated expressions so that infants can understand words (Newport, Gleitman & Gleitman, 1977; Snow, 1977; Keye, 1980; Morikawa, Shand & Kosawa, 1988). However, few relations between speech characteristics in pre-linguistic period and language production have been studied. Many studies have reported that maternal speech, especially maternal verbal responsiveness to infants

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influences infant language acquisition and predicts later language functioning, including vocabulary comprehension (Baumwell, Tamis-LeMonda, & Bornstein, 1997; Bornstein & Tamis-LeMonda, 1997; Bornstein, Tamis-LeMonda, & Haynes, 1999; Bornstein, Tamis-LeMonda, Tal, Ludemann, Toda, Rahn, Pecheux, Azuma, & Vardi, 1992; Tamis-LeMonda, Bornstein, Kahana-Kalman, Baumwell, & Cyphers, 1998; Bretherton & Bates, 1984; McLaughlin, White, McDevitt, & Raskin, 1983; Moerk, 1980; Toda, Azuma, & Bornstein, 1993). Bornstein et al., found that maternal speech to infants increased from 5 months to 13 months (1992), and maternal verbal responsiveness was stable from 13 to 20 months and predicted child vocabulary development (1999). It is suggested that maternal verbal responsiveness to infants with speech characteristics in pre-linguistic period may be one of the important factors for infant language development (Bloom, 1993).

Studies mentioned above have focused on maternal speech, but it is not clear whether mothers' behaviors are also related to infant language acquisition. Tamis-LeMonda, Bornstein, Cyphers, Toda, & Ogino (1992) observed mothers' behaviors in a mother-infant play situation and analysed them by using the same categories as infant play. The result shows that mother's play influenced infant play at 13 months of age. In contrast to the fact that American infants produced words more than Japanese infants, Japanese infants played at higher level than American infants did. Another study also found that maternal responsiveness predicted 18-month-old's play (Spencer & Meadow-Orlans, 1996). These studies show that maternal behaviors are associated with infant play development, but they are not reported whether mothers' behaviors contribute to infant language development. Toda et al., found that mother's nurturing responsiveness predicted infant language production (1993), but in this study, nurturing behaviors include both verbal and behavioral responsiveness. In daily life, when mothers play with infants, they interact with infants in a variety of behaviors such as giving, receiving, pointing a toy, or showing a model and so forth. On the other hand, infants look at such mothers' behaviors and at the same time they hear what she talks to them. Through mother-infant interaction, infants acquire the basic communicative skills such as turn-taking; consequently, infants become to understand and produce a word. However, previous studies have overlooked these mothers' behaviors which occur in mother-infant interaction every day and the association between maternal speech and behaviors.

To understand what kinds of maternal speech and behaviors infants select in mother-infant interaction, many researchers have investigated developmental process in language acquisition by comparing with different countries. In previous studies, some researchers reported the differences of maternal speech in pre-linguistic period in the United States and Japan (Bornstein, Tamis-LeMonda, Ludemann, Rahn, Tal, Toda, Pecheux, Azuma, & Vardi, 1992; Fernald & Morikawa, 1993, Toda, Fogel & Kawai, 1990). The most remarkable differences were the mother's communicative styles in a play situation. In the United States, mothers emphasized language in a way that mothers labeled and asked about objects. As a result, American infants may produce words more than Japanese infants do at 13 months like Tamis-LeMonda et al., found (1993). On the other hand, Japanese mothers emphasized social routines such as greeting or expressing empathy (Fernald & Morikawa, 1993). Fernald & Morikawa also found that mother's

communicative styles were similar between two countries even though infants got older. Toda et al.,(1990) showed that American mothers talked to 3-month-old infants like speaking to adult and Japanese mothers talked to infants using nonsense sound, onomatopoeia, calling the infant name and baby talk. These studies clearly show that even though mothers in both countries respond to infants, the contents they talked to infants or their communicative styles are different between two societies; consequently the associations between infant language development and maternal speech and behaviors may differ in the United States and Japan. However, it is not clear in what ways infants select maternal speech and behavior for the acquisition of linguistic knowledge and communicative skill (Blount, 1972), because few studies have investigated the relation between maternal speech and behaviors.

The present study focuses on only maternal speech and behaviors, and investigates 1) maternal speech and behavioral characteristics during mother-infant play, 2) the cultural characteristics of maternal speech and behaviors in the United States and Japan, and 3) the association between maternal speech and behaviors. When mothers talk to their infants, what behaviors do mothers show to infants? Do such behaviors differ in two societies? In maternal speech, we expect that American mothers will emphasize labeling objects by showing them. Whereas Japanese mothers will emphasize social routines by talking and showing a model about social manners or empathy as previous studies found. However, mothers' behaviors such as showing or giving a toy to infants may not differ between two countries.

Methods

Subjects: Forty-four 13-month-old infants and their mothers were recruited in the United States and Japan. Infants were full term and no complications at birth (male=10, female=12 in the US, male=11, female=11 in Japan). Mothers' average age was 31 years old in the United States and 29 years old in Japan at 5 months. The data in the present study were part of longitudinal study.

Procedures: The procedures were identical in both countries. The mother-infant play was observed for 15 minutes in their homes and videotaped. The mothers were asked to play with their infants using toys which were provided by an experimenter. Toys were appropriate for 13 months: a ball, a train, a doll and blanket, a teapot with cover, two spoons, two teacups and saucers, and two books.

Data reduction and coding: The present study analysed only three modes in maternal speech: labeling, social routines, and speech topics (Table 1). As seen in table 1, labeling is divided into two categories: adult form and onomatopoeia, social routines were 5 categories, and speech topics were 6 categories. Mother behaviors were 8 categories: giving, receiving, modeling, showing, gesturing, pointing, co-playing and other. Maternal speech and behaviors were coded by stopping the videotape whenever mothers stop their speech or change their behaviors. For example, if mothers say "spoon" showing a spoon, "labeling (adult form)" in speech and "showing" in behavior are counted. If mothers did not talk or behave more than two seconds, the next maternal speech or behavior was counted as a new utterance or behavior.

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Table 1 Description of maternal speech and behaviors

1. Maternal Speech	English	Japanese
1) Label: Labeling the objects		
a. Adult form	Train	Kisha
b. Onomatopoeic form	Choo-choo	Poppo
2) Social Routines: Talking about social routines		
a. Greeting	Hello	Konnichiwa
b. Social routines	Thank you or please	Arigato or dozo
c. Empathy or feelings	Make nice or hug the doll	Kawai kawai shite
d. Encouragement Praise infant behavior	Good or that's right	Jozu jozu
e. Other: Including correction of infant's positive or negative words		
3) Speech Topic: Occur in either syntactic style		
a. Objects Talking about objects	A ball is yellow	Boru kiiro ne
b. Infant activities Talking about infant action	Throw the ball	Boru nagete
c. Infant state Talking about infant state	What do you think?	Doo omou?
d. Mothers Talking about herself	I can throw the ball to you	Boru nageruwayo
e. Suggestion/Invitation Suggesting something to infants	How about this toy?	Kono omocha wa do?
f. Other		

2. Mothers' Behaviors	
1) Giving/Offering	Give or offer an object to infant
2) Receiving	Receive an object from infant
3) Modeling	Modeling behavior using toys
4) Showing	Show an object to infant
5) Pointing	Point an object
6) Gesturing	Gesture something
7) Co-playing	work together or support infant play
8) Other	Do something with an object or prepare the next activity.

Result

1. Maternal speech and behaviors

The total number of utterances in maternal speech was 195.5 (SD 66.0) in the United States and 136.6 (SD 50.2) in Japan, and an ANOVA showed the significant difference in country ($F(1,43)=11.06$, $p<.002$). The total number of behaviors was 130.3 (SD 46.3) in the United States and 101.7 (SD 41.2) in Japan, and an ANOVA showed the significant difference in country ($F(1,43)=5.08$, $p<.03$). Consequently, ANOVAs for speech and behavioral categories were conducted controling the total number of utterances or behaviors to examine the culture differences. Figure 1 shows the total frequencies of speech in each mode. ANOVAs were conducted for labeling, social routines and speech topic respectively to compare the United States with Japan. There were significant differences in labeling, social routines and speech topic. American mothers labeled the name of an object ($F(1,43)=9.59$, $p<.01$), talked about objects or infants ($F(1,43)=$

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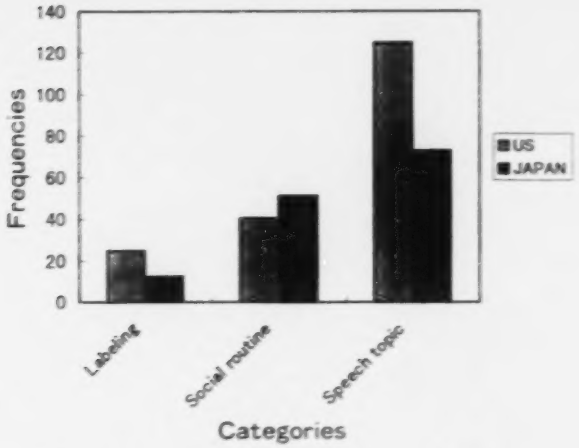

Figure 1 Mean frequencies of maternal speech

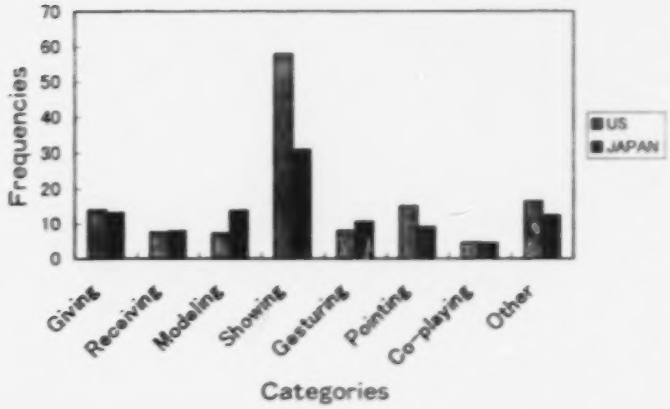

Figure 2 Mean frequencies of mothers' behaviors during speech

155.63, $p<.001$) more than Japanese mothers did, whereas Japanese mothers talked about social routines ($F(1,43)=18.21$, $p<.001$) more than American mothers did. Figure 2 shows the total frequencies of mothers' behaviors when mothers talk to infants. There were significant differences in modeling, showing, pointing. American mothers showed ($F(1,43)=14.01$, $p<.001$) and pointed a toy to infants ($F(1,43)=5.83$, $p<.05$) more than Japanese mothers did, whereas Japanese mothers showed a model more than American mothers did ($F(1,43)=4.86$, $p<.05$). However, when the total frequencies of behaviors were controled, giving and gesturing became significantly different between two countries. American mothers gave a toy more than Japanese mothers did ($F(1,43)=23.13$, $p<.001$), whereas Japanese mothers gestured more than American mothers did ($F(1,43)=14.17$, $p<.001$). These results show the cultural characteristics in maternal speech and behaviors.

2. Labeling

Mean frequencies of labeling and behaviors show in table 2. ANOVAs were carried

Table 2 Mean frequencies of maternal speech and behavior : Labeling

Categories		US Mean (SD)	Japan Mean (SD)	Signif.
Labeling				
	1) Adult form	22.4 (16.6)	8.9 (6.8)	**
	2) Onomatopoeic form	2.5 (3.5)	3.6 (3.6)	*
Behavior				
	1) Giving/Offering	1.2 (1.7)	1.0 (1.4)	**
	2) Receiving	0.5 (0.9)	0.3 (0.7)	
	3) Modeling	1.3 (4.5)	1.1 (2.7)	
	4) Showing	11.3 (9.3)	4.0 (3.6)	***
	5) Pointing	5.2 (5.5)	1.6 (2.0)	
	6) Gesturing	0.3 (0.6)	0.3 (0.9)	
	7) Co-playing	0.05 (1.1)	0.05 (1.0)	
	8) Other	1.0 (1.1)	0.5 (1.0)	

*p<.05 **p<.01 ***p<.001

out controling the total number of speech and behaviors. There was significant difference in labelling. American mothers labeled objects with adult form more than Japanese mothers did ($F(1,43)=7.29$, $p<.01$), whereas Japanese mothers talked to infants with onomatopoeic form more than American mothers did ($F(1,43)=5.08$, $p<.05$). In behaviors there were significant differences in giving and showing. When American mothers talked to infants, they were likely to give ($F(1,43)=8.11$, $p<.01$) or show a toy ($F(1,43)=11.98$, $p<.001$) to infants. These findings suggest that American mothers emphasize the word in a way that they try to get attention from infants and teach a word by giving or showing a toy to accord with the name of an object so that infants can understand more easily.

The correlation analyses between labeling and behaviors were carried out in each country respectively. In the United States, " labeling " was positively correlated with co-playing ($r=.50$, $p<.05$), pointing ($r=.66$, $p<.001$), receiving ($r=.45$, $p<.05$), and showing ($r=.92$, $p<.001$). It means that American mothers tended to label an object when they co-played with infants, received a toy from the infant, showed or pointed a toy. On the other hand, in Japan " labeling " was positively correlated with giving ($r=.57$, $p<.05$), modeling ($r=.57$, $p<.01$), showing ($r=.67$, $p<.001$), and gesturing ($r=53$, $p<.05$). Japanese mothers tended to label an object when they gave or showed a toy, showed a model or gestured. These results suggest that even though mothers label an object, how to get attention from infants or how to teach a word was different in two societies.

3. Social routines

A table 3 shows mean frequencies of social speech and behaviors in each country. ANOVAs were carried out controling the total number of speech and behaviors. There were significant differences in encouragement, social routines, and empathy. American mothers encouraged infants more than Japanese mothers did ($F(1,43)=15.26$, $p<.001$), whereas Japanese mothers talked about social routines ($F(1,43)=4.97$, $p<.05$) and empathy ($F(1,43)=4.89$, $p<.05$) more than American mothers did. In behaviors there

Table 3 Mean frequencies of maternal speech and behavior: Social routines

Categories	US Mean (SD)	Japan Mean (SD)	Signif.
Social routines			
1) Greeting	13.5 (9.9)	14.6 (13.8)	
2) Social routines	7.0 (6.9)	22.5 (16.9)	*
3) Empathy or feelings	4.9 (5.0)	18.4 (16.2)	*
4) Encouragement	14.5 (7.5)	3.4 (2.8)	***
5) Other	1.3 (2.8)	1.4 (3.5)	
Behavior			
1) Giving	3.5 (3.6)	7.0 (5.3)	**
2) Receiving	4.5 (4.3)	5.2 (5.2)	
3) Modeling	2.9 (3.6)	9.1 (9.4)	*
4) Showing	6.3 (5.0)	6.1 (7.0)	
5) Pointing	0.5 (0.9)	1.3 (2.8)	
6) Gesture	3.0 (2.8)	7.3 (1.5)	**
7) Co-play	1.7 (2.1)	1.5 (1.9)	*
8) Other	2.0 (1.8)	2.7 (3.5)	*

*$p<.05$ **$p<.01$ ***$p<.001$

were significant differences in giving, modeling, gesturing, co-playing and other. American mothers co-played more than Japanese mothers did ($F(1,43)=5.11$, $p<.05$), whereas Japanese mothers gave a toy ($F(1,43)=7.84$, $p<.01$), showed a model ($F(1,43)=6.90$, $p<.05$), and gestured ($F(1,43)=7.38$, $p<.01$) more than American mothers did. In mother-infant play, Japanese mothers preferred the use of a doll when they express the empathy or feelings.

The correlation analyses between speech and behaviors were carried out in each country respectively. In the United States "social routines" were positively correlated with receiving ($r=.83$, $p<.001$). American mothers were likely to talk about social routines such as "thank you" when they received a toy from infants. In Japan, "greeting" was positively correlated with gesturing ($r=.49$, $p<.05$) and showing a model ($r=.52$, $p<.05$). "Social routines" were positively correlated with giving ($r=.48$, $p<.05$), receiving ($r=.77$, $p<.001$), showing a model ($r=.57$, $p<.01$), gesturing ($r=.68$, $p<.001$), and pointing ($r=.53$, $p<.05$). "Encouragement" was positively correlated with co-playing ($r=.61$, $p<.01$). When Japanese mothers talked about greeting, they were likely to show a model or gesture, and also Japanese mothers were likely to talk about social routines when they gave and received a toy from infants, pointed a toy, showed a model or gestured. "Empathy" was positively correlated with giving ($r=.50$, $p<.05$), gesturing ($r=.51$, $p<.05$). When Japanese mothers talked about empathy, they were likely to give a toy or gesture. Also when Japanese mothers co-played with infants, they were likely to encourage infants. These findings that Japanese mothers talked about social routines or empathy by giving, receiving, showing a model, pointing, or gesturing more than American mothers suggest that Japanese mothers teach social manners and empathy using toys, especially a doll, in contrast to American mothers who teach the name of objects.

Table 4 Mean frequencies of *maternal speech and behavior : Speech topics*

Categories	US Mean (SD)	Japan Mean (SD)	Signif.
Speech topic			
1) Objects	52.2 (23.4)	40.2 (21.6)	***
2) Infant activities	61.0 (28.8)	24.1 (14.6)	***
3) Infant states	7.8 (5.3)	3.5 (3.0)	**
4) Mother themselves	0.9 (1.1)	0.5 (1.2)	
5) Suggestion/Invitation	3.9 (4.3)	4.1 (4.7)	**
6) Others	4.2 (3.5)	0.5 (2.1)	
Behavior			
1) Giving/Offering	9.2 (6.1)	5.2 (4.0)	**
2) Receiving	2.6 (2.7)	2.4 (2.6)	
3) Modeling	3.1 (3.3)	3.5 (3.5)	*
4) Showing	40.2 (20.5)	20.6 (16.1)	***
5) Pointing	9.2 (6.7)	6.5 (5.2)	***
6) Gesturing	4.6 (5.3)	2.8 (3.6)	**
7) Co-playing	2.8 (3.5)	2.9 (6.5)	
8) Other	13.4 (9.1)	9.2 (6.1)	***

* $p<.05$ ** $p<.01$ *** $p<.001$

4. Speech topics

A table 4 shows mean frequencies in maternal speech topics and behaviors. ANOVAs were carried out controling the total number of speech and behaviors. There were significant differences in object, activity, states, and suggestion/invitation. American mothers talked about objects ($F(1,43)=63.90$, $p<.001$), infants' activities ($F(1,43)=72.64$, $p<.001$) and infants' states ($F(1,43)=7.83$, $p<.01$) more than Japanese mothers did. It is clear that American mothers talked about infants (activity and states) more than Japanese mothers ($F(1,43)=69.38$, $p<.001$, 68.8 in the US, 27.6 in Japan). Whereas Japanese mothers talked about suggestion/invitation ($F(1,43)=8.99$, $p<.01$) more than American mothers did. In behaviors, there were significant differences in giving, modeling, showing, pointing, gesturing and others. They were likely to give ($F(1,43)=8.59$, $p<.01$), show ($F(1,43)=52.19$, $p<.001$), point a toy ($F(1,43)=14.35$, $p<.001$) and gesture ($F(1,43)=9.77$, $p<.01$) more than Japanese mothers did, whereas Japanese mothers showed a model more than American mothers did ($F(1,43)=4.87$, $p<.05$).

The correlation analyses between speech topics and behaviors were carried out in each country respectively. In the United States, " object " was positively correlated with giving ($r=.66$, $p<.001$), showing ($r=.82$, $p<.001$) and pointing ($r=.70$, $p<.001$). When American mothers talked to infants about objects, they were likely to give, show or point a toy. " Activity " was positively correlated with giving ($r=.52$, $p<.05$), showing ($r=.71$, $p<.001$) and gesturing ($r=.63$, $p<.01$). When American mothers talked about infant activities, they were likely to give, show a toy or gesture. " Suggestion/ invitation " was positively correlated with gesturing ($r=.66$, $p<.001$). When American mothers suggest something, they were likely to gesture. These findings suggest that American mothers talk about objects or infants by giving, showing, pointing toys or gesturing more than Japanese mothers do. In Japan," object " was positively correlated

with giving ($r=.47$, $p<.05$), receiving ($r=.53$, $p<.01$), showing ($r=.67$, $p<.001$) and pointing ($r=.69$, $p<.001$). When Japanese mothers talked about objects, they were likely to give, receive and point an object. "Activity" was positively correlated with giving ($r=.72$, $p<.001$), modeling ($r=.55$, $p<.01$), and co-playing ($r=.77$, $p<.001$). When Japanese mothers talked about infant activities, they were likely to give a toy, show a model, or co-play with infants. "Mother" was positively correlated with showing ($r=.53$, $p<.05$). When Japanese mothers talked about themselves, they were likely to show a toy. These results suggest that behaviors were different by what topics mothers talk about and these differences may express their cultural characteristics.

Discussion

The present study investigated the characteristics of maternal speech and behaviors at 13 months of age. The results clearly showed the cultural characteristics of maternal speech and behaviors, and confirmed findings in previous studies. American mothers talked about objects, especially labeled the name of an object by showing and pointing a toy. It seems that American mothers teach that each object has a name because infants begin to produce a word at around this age. Also American mothers significantly encouraged infants and talked about infants more than Japanese mothers did. These findings suggest that American mothers may emphasize self from infancy to adapt to the society. In contrast to American mothers, Japanese mothers significantly talked about social routines and empathy more than American mothers did. It seems that the mother's characteristic speech reflects cultural characteristics that American culture emphasizes language and self development and Japanese culture emphasizes social and emotional development, and these culture specificities may transfer to the next generation. Further research is needed to explain these hypotheses.

In behaviors, when mothers talk to 13-month-old infants, they usually show a variety of behaviors such as giving, modeling, showing, pointing, gesturing and co-playing so that infants pay attention to both maternal speech and behaviors. Among these behaviors, mothers use "showing" behavior most for 13-month-old infants in both countries. When American mothers talked to infants, they were likely to show or point a toy more than Japanese mothers did, whereas Japanese mothers were likely to show a model or gesture more than American mothers did. It is clear that most of the maternal speech to 13-month-old infants entails behaviors, and the characteristic behaviors are related to what mothers talk to infants. It suggests that when American mothers talk about objects and infants they select showing and pointing behaviors as an effect way for infants to learn and when Japanese mothers talk about social routines and empathy, they select modeling or gesturing as an effect way. Also the present findings suggest that maternal speech and behaviors may foster the ground of both language acquisition and socialization but what mothers emphasize depends on social value in each country. The next research may investigate associations between mothers' behaviors and infant language development or socialization and which behaviors infants select as the most effective way for language acquisition or socialization, by observing infant language and behaviors. To understand the process of language development corresponding to relationships between infant behavior and maternal speech and behavior, we need a

longitudinal study.

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THE EFFECTS OF TEMPO AND PITCH ON THE JUDGEMENT OF INFANT CRIES

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Abstract

Two experiments were performed to examine the effects of tempo and pitch on the identification of infant cries by manipulating the duration and F_0 of the cries using a signal processing method. The subjects employed for these experiments were inexperienced in infant care, so they were given training on how to categorize cries at the beginning of each experiment. In experiment 1, 68 subjects, all of them university students, were asked to identify stimuli subjected to duration manipulation by making a forced choice among three categories: hunger, anger, and call. In experiment 2, 89 subjects, all of them university students, were asked to identify stimuli subjected to pitch manipulation or manipulations involving both duration and pitch. An analysis was made on the data of the 40 subjects for experiment 1 and 55 subjects for experiment 2 respectively, who successfully learned how to categorize the cries in their prior training. The results from the two experiments indicate that tempo is the predominant perceptual cue and pitch secondary, for discrimination between hunger and anger but not for call.

Key Words: infant cries, tempo, pitch, perceptual judgement

Infant cries in the preverbal stage are the primary mode to communicate the need for secure nurturance from the environment. They are, however, graded signals and do not convey discrete message with a single meaning (Murray, 1979; Zeskind, Sale, Maio, Huntington, & Weiseman, 1985). In this sense, the communicative value of infant cries has been studied through the feature analyses of cries and/or their perception by adult listeners. A number of analytical studies of infant cries have revealed that they are characterized by differences in the fundamental frequency (F_0) and duration: the mean and dynamic range of F_0 (Murry, Hoit-Dalgaard, & Gracco, 1983) and the temporal

This research was conducted when the author was with ATR Auditory & Visual Perception Research Laboratories in collaboration with Dr. Yoh'ichi Tohkura. It is noted that Experiment 1 in this study was partially presented at 119th meeting of the Acoustical Society of America, Pennsylvania, 1990, and Experiment 2 at the meeting of the 4th International Workshop on Infant Cry Research, Munich, 1992.

patterns of F_0 (D'Odorico, 1984; Rosenhouse, 1977; Wasz-Höckert, Lind, Vuorenkoski, Partanen, & Valanne, 1968), and the temporal structure of phonation and non-phonation (Kobayashi, Oda, & Murooka, 1986; Tsukamoto & Katagiri, 1988; Wolff, 1967, 1969). Many studies on the relationship between physical acoustic features and perception of the infant cries have demonstrated that these acoustic features are also related to the perception of cries with different impressions by the listener (Bates, Freeland, & Lounsbury, 1979; Bisping, Steingrueber, Oltmann, & Wenk, 1990; Gustafson & Green, 1989; Lounsbury & Bates, 1982; Wiesenfeld, Malatesta, & DeLoach, 1981; Zeskind, 1985; Zeskind & Lester, 1978; Zeskind & Marshall, 1988). These findings suggest that the infant cries provide certain information to listeners trying to judge why the infant is crying. On the other hand, several studies on judgment of infant cries have focused on whether adult listeners are able to identify the cry types correctly and, if so, to what extent (Müller, Hollien & Murry, 1974; Scherman, 1927; Wasz-Höckert et al., 1968). However, there is no agreement among their experimental results due to the methodological differences, i.e., the cry types and subject groups used in their experiments, between experiments. Another important requirement is to clarify the process of cry judgment: which acoustic features help to differentiate the infant cries and they interpreted by the adult listeners? In this view, our current question is: which acoustic features are relevant perceptual cues to the judgment of infant cries.

The cry of younger infants is fundamentally an involuntary vocal expression evoked by the inner stress related to the balance of homeostasis (i.e., biological and self-organizing functions to help adapt to the environment) and/or the state transitions of the sleep/wake cycle. It has been considered that, physiologically, cry production involves the larynx, vocal tract and respiratory system and, neurologically, probably the central nervous system (CNS) and anatomic nervous system (ANS) (Boukydis, 1985; Golub & Corwin, 1985; Lester, 1978, 1984; Lester & Zeskind, 1982; Michelson & Wasz-Höckert, 1980; Wolff, 1967, 1969). Physiological and anatomical maturation of the infant brings developmental differentiation and an acoustical change in the cry in the month after birth: not only do physiological and biological cries (e.g., a hunger cry) appear but also psychological cries such as a call cry, which demands frequent interaction and/or bodily contact with his/her caregiver (Lester, 1985; Tsukamoto, 1985; Wolff, 1969). The pattern of the cry remarkably shifts from one that is simple and rhythmic in the neonate to one that is complex and irregular (Futatsugi, 1979; Wolff, 1969). The cry is also a vocal expression of emotional arousal as the activities of the CNS and ANS are closely related to emotion (Fox & Davidson, 1986; Lester, 1985). From these physiological and anatomical indications, it is presumed that different acoustic patterns of cries represent different emotional states of the infant and also provide some information to the listener trying to infer why the infant is crying.

Comprehensive suggestions on how to proceed with the study of cry judgment are from studies of the relationship between emotion and vocal expression in the field of speech communication where is generally recognized that so-called prosody, e.g., pitch, intonation (or melody), rhythm, and tempo, plays an important role in conveying a communicator's emotion or attitude (Scherer, 1979; Scherer, Ladd, & Silverman, 1984; Williams, & Stevens, 1972). According to reviews by Scherer (1979, 1982, 1986), F_0,

the variability or range of F_0, loudness, and tempo are important parameters linked to specific emotions: for instance, a high pitch level and wide pitch range, loud voice, and fast tempo, appear to characterize anger, whereas the opposite ends of these vocal dimensions, i.e., a low pitch level and narrow pitch range, downward pitch contour, soft voice, and slow tempo, appear to characterize grief/sadness. Simply put, these acoustic features are used to judge the communicator's emotional states and are thought to be also used as perceptual cues for interpretation of infant cries.

This inference is supported by a findings from our preliminary experiment (Tsukamoto, 1991), which examined the relationship between auditory impression and identification of infant cries by adults. In this experiment, we used four cry categories, hunger, anger, sleepiness, and call, and employed two groups of subjects: mothers who cared for their infants and female university students. The results showed that verbal responses to the auditory impression to cry stimuli were surprisingly similar between the mothers and university students. The most frequent verbal responses were related to the emotional states or events. On the other hand, for the results of identification by free choice, the mothers could identify hunger, sleepiness, and call cries significantly well, while the university students could identify anger and call cries as well as, or even better than, the mothers. These results suggest that the representations of the auditory impressions of the cries are attributed to an emotional dimension inherent in their infant care experiences. In other words, prosody-related acoustic features linked to emotions were possibly used as perceptual cues in representing the auditory impressions and also in judgment of the cries. Our present interest is how these acoustic features, as perceptual cues, affect the judgment of infant cries.

In discussing this issue, a method considered effective and used in the speech perception of emotional expressions (Carlson, Granstrom, & Nord, 1992; Kitahara & Tohkura, 1992; Ladd, Silverman, Tolkmitt, Bergmann, & Scherer, 1985), is employed to manipulate each acoustic feature characterizing the infant cries and to investigate how the manipulations affect the resulting judgment. In this study, we focused on two acoustic features, tempo and pitch, and designed two experiments to examine how tempo and pitch affect the judgment in identifying cry categories based on the infants' states. In these experiments, natural cries recorded in home situations were employed and their duration and F_0 were manipulated by using a digital signal processing method, and then cry stimuli with various tempo and pitch parameters were presented to the adult subjects to examine how these two factors affect the identification of cries.

Cry Samples

Cries of normal and healthy infants were videotaped (SONY SL-F1; SONY CCD-V8AF2) during mother-infant interactions. The observations of the infants, who ranged from 3 weeks to 12 months of age, were made in one-hour biweekly visits. The observers were several university students majoring in psychology, and one of the authors. Records were made by each observer on the behavior of the mothers and infants, and records were also made of "the infant's life rhythm" by the mothers who noted each instance of a diaper change, sucking or feeding, and sleep, as well as the awareness and physical condition of their infants the day before an observation was to take place.

In order to classify the cries, the observers evaluated them according to the infants' situations by watching repeated playbacks of the videotapes and reviewing all observations on the infant reported by their mothers. Cry category classification was done by consensus, i.e., more than 85% of the observers had to agree for a classification to be accepted. Thus, the cries were eventually classified into several categories based on what caused them to occur. We found that the cries were often produced not only by simple situations, but also for complex physical or psychological reasons and that their role in communication was functionally changed by the infant's behavioral development around six months of age (Tsukamoto, 1985; Yamada, 1982).

For this study, as samples we chose nine cries produced by simple situations before six months of age and divided them into three categories, i.e., hunger, anger, and call,. (Here, we define a call cry as a psychological cry demanding interaction and/or bodily contact with a caregiver.) These cry samples were produced by four infants ranging in age from 9 to 17 weeks. The overall duration of each sample was around 30 s.

Acoustic Properties of Samples

Prior to the perceptual experiment, it was necessary to study the acoustic features of cry samples. The samples were digitized by computer (MASSCOMP 5600) at a sampling frequency of 20 kHz (LPF=10 kHz, -96 dB/oct) and were analyzed to extract the fundamental frequency (F_0) and duration. F_0 was measured every 2.5 ms by applying an autocorrelation pitch extractor to the cry waveforms. The duration of the segmental units and pitch duration were measured at a time resolution of 2.5 ms by observing digital spectrograms and the cry waveforms A segmental unit is defined as a breath group of the cries, consisting of all the vocalizations occurring during a single respiration, and a pitch duration is defined as the duration of the vocalized parts in which clear harmonics of F_0 can be continuously observed in the spectrograms. To clarify the acoustic properties of cry samples, statistical distribution of the pitch durations and F0s for each sample are illustrated in histograms.

Figure 1 shows the pitch duration distribution of samples for each of the three categories. The pitch duration is quantized every 250 ms and its occurrences are normalized by the total number of occurrences. In this figure, the ordinate shows the pitch duration occurrences, while the abscissa shows pitch duration length. Differences in the pitch duration distributions can be found among the three categories. For the hunger samples, the histograms are somewhat skewed to a short duration. For the anger samples, the histograms for the three samples are similar and also considerably more skewed to a short duration. On the other hand, for the call samples, the pitch duration has a wider distribution and the histograms for the three samples show fewer similarities. Figure 2 shows the F_0 distribution for each of the three categories. In this figure, F_0 is quantized every 50Hz, and its occurrences are normalized by the total number of occurrences. The ordinate shows the F_0 occurrences, while the abscissa shows the F_0 value. For both the hunger and anger samples, the variances of F_0 are somewhat broad and the peak frequencies of the histograms are, to some extent, different among the three samples. On the other hand, for the call samples, the variances of F_0 and the peak frequencies are rather similar for all three samples.

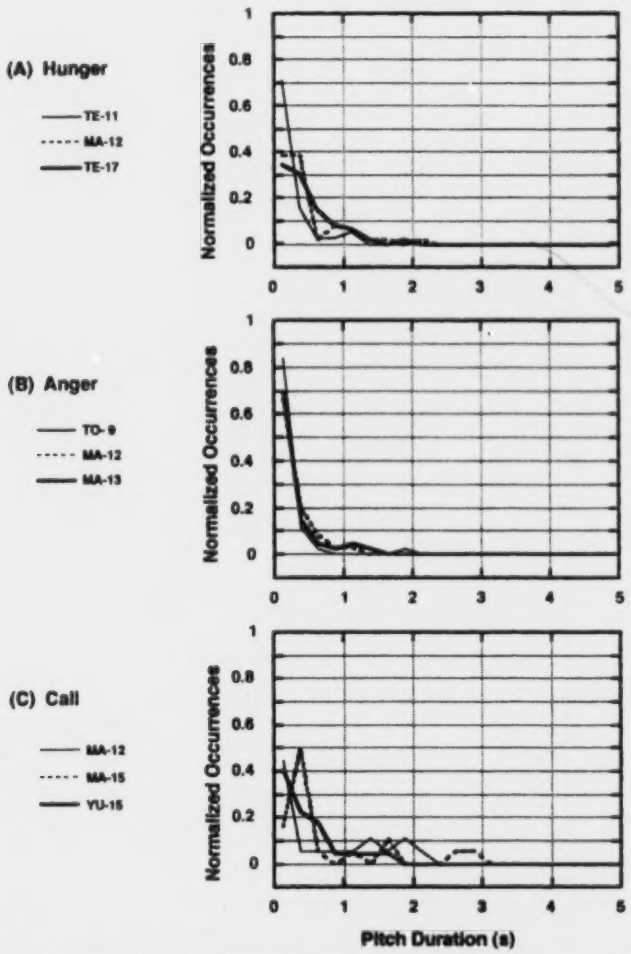

Figure 1 Pitch duration distributions for three cry categories. (A) is for three samples of hunger. (B) is for three samples of anger, and (C) is for three samples of call. Each plot has three distributions obtained from different cry samples. MA, TE, TO, and YU represent individual infants.

From these analyses of the pitch duration and F_0, it may not be easy to derive a quantitative correlation between these acoustic features and cry categories. However, similarities and differences showed within and between the three categories suggest that each cry category might have its own acoustic properties. Among these acoustic properties, the duration and F_0 are our main concerns and their role as perceptual cues for the identification of cry categories in discussed by perceptual experiments in this study.

Training

This study consisted of two experiments to examine the effects of tempo and pitch on the identification of infant cries using three categories: hunger, anger, and call. In the two experiments, we employed subjects who had had no experience in infant care. We designed a training session of cry category identification for the start of each experiment

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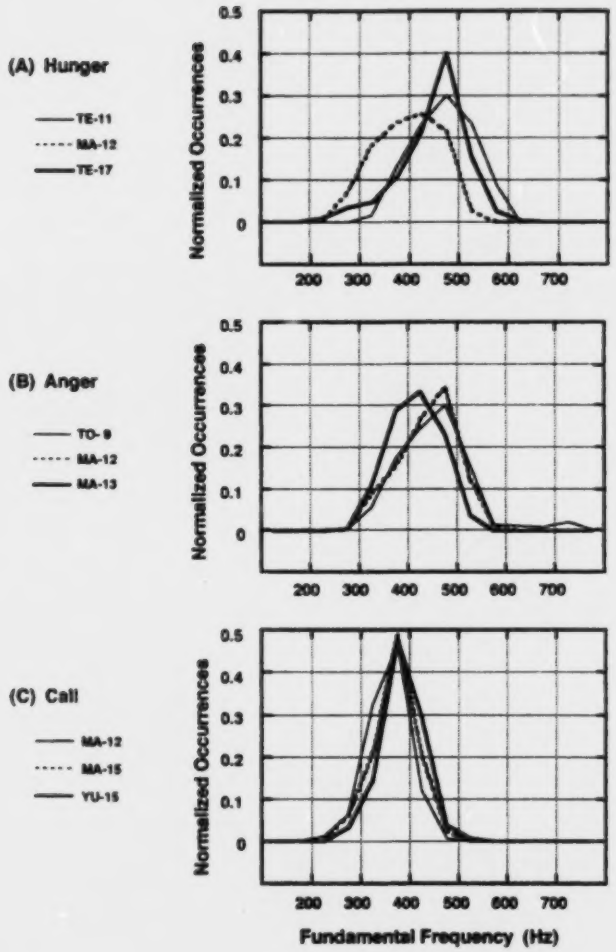

Figure 2 Fundamental frequency distributions for three cry categories. (A) is for three samples of hunger, (B) is for three samples of anger, and (C) is for three samples of call. The same samples as those used in Figure 1 have been employed.

to help the subjects learn how to categorize the cries. The subjects were expected to learn the distinctive features peculiar to each of the three categories.

To more efficiently to conduct these experiments, we examined the cry length needed for accurate identification of cry reasons in our previous experiment (Tsukamoto & Tohkura, 1990). The results showed that the perceptual units, which were correctly identified by more than 85% of the adult subjects, were from six to eight seconds' minimum duration through the three categories. As these perceptual units were assumed to contain typical acoustic features that corresponded to the cry categories, we excised portions of the perceptual units from each of the nine samples and employed them as stimuli in the training sessions and the two experiments.

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Method

Stimuli

In the training session, two stimuli were used for each category. That is YU-15 weeks and MA-17 weeks for call, TE-11 weeks and TE-17 weeks for hunger, and TO-9 weeks and MA-12 weeks for anger. Cry durations ranged from 10.6 to 12.6 s.

Training procedure

The training for cry category learning consisted of four stages: (1) listening trials, (2) identification trials, (3) listening trials, and (4) the identification test. In the listening trials, the stimuli were presented twice in succession with their category labels given to the subjects prior to listening. In the identification trials, the same stimuli as those used in the listening trials were presented twice in random order (12 stimuli in total, inter-stimulus interval (ISI) = 3 s). The subjects were instructed to identify the stimuli by making a forced choice among the three categories: hunger, anger, and call cries. After the three trials, an identification test was carried out for each of the subjects. In this test, the same procedure as that in the identification trial in the training was used, except that the stimuli were presented in a different random order. Subjects who correctly identified all 12 stimuli were regarded as having who successfully learned the categorization of cries in the training.

All stimuli were recorded once on a digital audio tape (SONY DTC-1000ES) and presented to the subjects through headphones (STAX SRM-1/MK-2) in a sound booth. This training lasted about 15 min followed by about a 10-minute break and then the experiment.

Experiment 1

The purpose of this experiment was to examine the effect of tempo on the identification of cry categories by manipulating the duration of the cries.

Method

Subjects

The subjects were 36 female and 32 male university students ranging in age from 19 to 24 years. None had had experience in infant care.

Stimuli

Original stimuli. Three samples, one for each category, produced by one of the infants, but different from those used in the training, were chosen from the nine samples: call, MA-15 weeks; hunger, MA-12 weeks; and anger, MA-13 weeks. From each of these three samples, two of perceptual units were generated as two original stimuli between 6.6 and 8.1 s in duration. The acoustic features of the original stimuli are shown in Table 1.

Stimulus series. The duration of the original stimuli was changed using a signal reconstruction method based on a short-time Fourier transform (Abe, Tamura, & Kuwabara, 1989; Griffin & Lim, 1984). It is important to note that this method is capable of modifying the acoustic features independently: i.e., compressing and expanding the duration (time scale of the signals) while keeping the segmental frequency structures

Table 1 *Original Stimuli (MA) Used in Experiment 1*

Category / Stimulus	Age (weeks)	Segmental Duration (s) Mean	Max.	Min.	Fundamental Frequency (Hz) Mean	Max.	Min.
Hunger							
H1	12	1.02	1.39	0.31	398.1	502.5	247.9
H2		1.23	1.74	0.62	427.7	689.1	230.1
Anger							
A1	13	1.69	2.31	0.64	427.2	557.8	285.1
A2		1.75	3.02	0.51	440.8	539.3	301.9
Call							
C1	15	1.94	5.04	0.53	353.7	430.3	215.3
C2		3.38	4.75	1.50	372.0	466.9	169.5

unchanged, and also capable of modifying F_0 while leaving the formant and temporal structures of the cries unchanged. The range of expansion and compression was set at 0.4 to 2.5 to avoid unrealistic conditions and to obtain stimuli with no perceived distortion. Furthermore, taking account of experiment efficiency, a preliminary experiment was carried out to determine the effective ranges of expansion and compression for each category. Thus, the anger stimuli were changed by expansion only in four steps (1.0 (original), 1.5, 2.0, and 2.5), the call stimuli by compression only in four steps (1.0 (original), 0.67, 0.5, and 0.4), and the hunger stimuli were changed by both compression and expansion in five steps (0.5, 0.67, 1.0 (original), 1.5, and 2.0). (Note that, for instance, compression or expansion at a ratio of 2.0 makes cry stimuli 2 times as fast or slow as the original stimuli.)

Procedure

The stimulus series was generated from two original stimuli for each category, so 26 stimuli including the original stimuli were generated in all. In addition to these 26 stimuli, another 14 stimuli (which were also excised from the same samples but from different portions) were prepared for embedding in the stimulus series as dummy stimuli. The total number of stimuli for this experiment was 40. These 40 stimuli were randomized and another 10 dummy stimuli were added at the beginning. Fifty stimuli were recorded on a digital audio tape (SONY DTC-1000ES). The ISI was set at 3 s, and a beep was presented at the beginning of each stimulus. Furthermore, three beeps were presented every 10 stimuli as a block sign. Taking into account the order effect of stimulus presentation, two tapes with different random orders were prepared and presented to counterbalanced groups of subjects. The subjects were required to identify each stimulus by making a forced choice among the three categories: hunger, anger, and call. The experiment lasted about 15 min. and was conducted in a sound booth after training. All stimuli were presented to the subjects through headphones (STAX SRM-1/MK-2).

Results and Discussion

The results were analyzed based upon the response data for 40 (25 women and 15 men) of the subjects who successfully learned the categorization of cries in their training. There were 28 subjects (11 women and 17 men) who failed to learn cry categorization. As the purpose of this experiment was to examine the effect of tempo by duration

manipulation, the sex of subjects was ignored in the analysis of the results. From these data, similar response properties were observed between the two stimulus series generated from the two original stimuli for each category. Accordingly, the responses of 40 subjects for each stimulus between the two stimulus series were averaged and the relationships between the correct response rates and the variations of duration were analyzed in each category. Here, correct responses to the stimuli were defined as responses to the same category as that of the original. To clarify the relationships between the stimuli and responses, averaged responses for each stimulus are illustrated in Figure 3. In this figure, (A) is for the hunger, (B) is for the anger, and (C) is for the call stimuli. For the hunger cry, the correct response rates decreased from 38% to 18.8% when the duration was compressed and increased to 55%, which was higher than those for the original stimuli, when the duration was expanded (χ^2 (4, $n=40$) = 36.39, $p<.001$). For the anger cry, when the duration was expanded, the correct response rates decreased from 66.3% to 27.5% (χ^2(3, $n=40$) = 77.88, $p<.001$). For the call cry, the correct response rates also decreased from 93.8% to 70% when the duration was compressed, although the stimuli were still predominantly identified as call cries (χ^2(3, $n=40$) = 8.83, $p<.05$). These results showed that the correct responses significantly decreased in all three categories when manipulating the duration. However, the effect of duration change was different among the three categories. Moreover, for the hunger and anger stimuli, category shifts were shown between these two categories: when the duration was compressed for the hunger stimuli, more than half of the responses were identified as anger cries and when the duration was expanded for the anger stimuli, more than half of responses were identified as hunger cries. It was shown that the categories shift between the hunger and anger cries when the duration of original stimuli is changed. Taking this finding into consideration, it is indicated that the discrimination between hunger and anger cries is related to the tempo: a cry with a faster tempo tended to be identified more as anger and a cry with a slower tempo tended to be identified more as hunger. In contrast, when the duration was

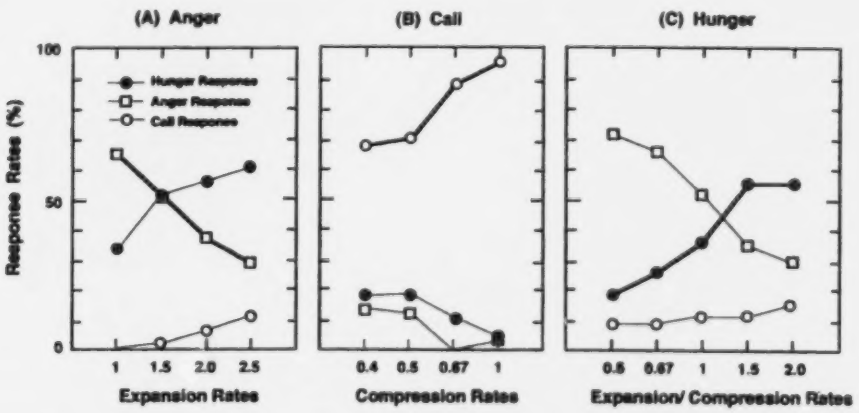

Figure 3 Relationships between response rates and the variations of duration for three cry categories: (A) is for anger, (B) is for call, and (C) is for hunger. Bold lines represent correct responses in three cases. The correct response rates significantly decreased in all three categories when changing the duration.

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compressed to over 0.5, the correct response rates for the call stimuli were always higher than 70%, though to some extent they were identified as hunger (17.5%) or anger (11.5%). Accordingly, it is assumed that there might be other perceptual cues than the tempo that characterize the call cries.

Considering the general response properties for the three kinds of cries used in the experiment, the call stimuli were perceived as quite different from those of the other two categories while the hunger and anger stimuli were easily confused with each other. The results showed that the correct response rates to the original hunger stimuli in this experiment stayed as low as under 40%, though they were the same portion identified at rather high rates (over 85%) found in the previous experiment (Tsukamoto & Tohkura, 1990). One reason for this gap in the correct response rates seems to be related to the differences in the stimulus sets in the two experiments. In the previous experiment, the stimulus set consisted of a number of segment units with a variety of acoustic features. In this experiment, however, six stimuli (two for each category), which differed in various acoustic features, were used as the original stimuli. All other stimuli had segmental features that were similar to those of the original, and probably could be differentiated mainly through tempo. To avoid a perceptual bias, which may occur when using stimuli that are similar to each other, 14 dummy stimuli were embedded throughout the 26 stimuli. However, this might not be sufficient to entirely normalize the perceptual bias and reduce the subjects' excessive concentration on differences in tempo. As a result, the anger and hunger stimuli were differentiated mainly through tempo, regardless of the differences in some other acoustic features. Eventually, perceptual cues, which were used to identify the hunger cries in the previous experiment, might be less effective in this identification test. Another reason seems to be that the subjects tended to overly rely on tempo to differentiate anger and hunger cries. Accordingly, the subjects identified hunger stimuli with a faster tempo as anger cries even though they were the original stimuli. In fact, the two original hunger stimuli used in this experiment are composed ot repetitions or relatively short segments, which presumably cause perception of a faster tempo (see Table 1). Therefore, it is considered that the correct response rates for the expanded hunger stimuli were higher than for the original. Summarizing this discussion, cry tempo is a reliable cue for discriminating between hunger and anger cries. With regard to the call cry, it is assumed that there might be other perceptual cues that influence the judgement of cries.

Experiment 2

Taking account of the results in experiment 1, the purpose of this experiment was designed to examine the effect of pitch, under different temporal conditions, on the identification of cry categories by manipulating the duration and F_0 of the cries.

Method

Subjects

The subjects were 60 female and 29 male university students ranging in age from 18 to 26 years. None had had infant care experience.

Stimuli

Original stimuli. The original stimuli used in this experiment were similar to those

in experiment 1 (see Table 1), though they differed in duration.

Stimulus series. From each original stimulus, a stimulus series was generated by combining the seven pitch levels and three tempi. For the tempo conditions, three kinds of duration transformations were employed: unchanged (original), compressed, and expanded. The transformation ratios chosen were different for the three categories, based on the results of the experiment 1. For compression, the transformation ratios were set to 0.5, 0.5, and 0.67 for call, hunger, and anger, respectively. For expansion, however, the transformation ratios were set to 1.5, 1.5, and 2.0 for call, hunger, and anger, respectively. As for pitch, seven levels were constructed by shifting F_0 with ratios of 1.3, 1.2, 1.1, 1.0 (original), 0.9, 0.8, and 0.7.

Procedure

There were 126 stimuli (3 tempo conditions x 7 pitch level variations x 2 stimulus series x 3 categories) in total. From the results of experiment 1, it was presumed that the subjects might tend to notice which acoustic parameters of the stimuli had been manipulated after repeatedly listening to stimuli with similar acoustic features. Therefore, to avoid this experimental distortion, 54 dummy stimuli were added to the 126 stimuli, 180 stimuli being prepared in total. These 180 stimuli were randomized and divided into two sets of 90 stimuli each. Another 10 dummy stimuli were added at the beginning of each set (100 stimuli in total). These two sets were recorded on a digital audio tape (SONY DTC-1000ES). The ISI was set at 3 seconds, and a beep was presented at the beginning of each stimulus. Furthermore, three beeps were after presented every 10 stimuli as a block sign. This procedure was repeated to prepare another tape with two sets of 100 stimuli in a different random order. These two tapes were presented to counterbalanced groups of subjects by taking account of the order of stimulus presentation. The two sets in each tape were presented to each subject group at different sessions with a short break in -between (about 5 min). The subjects were required to identify each stimulus by making a forced choice among the three categories: hunger, anger, and call. The experiment lasted about 50 min. and was conducted in a sound booth after training (see details under Training). All stimuli were presented to the subjects through headphones (STAX SRM-1/MK-2).

Results and Discussion

Effect of Fundamental Frequency

The results were analyzed based upon the response data given by 55 (38 women and 17 men) of the subjects who successfully learned cry category identification in the training session. The subjects who failed to learn numbered 34 (22 women and 12 men). To examine the effect of F_0, the correct response rates for the stimuli under three tempo conditions were analyzed. As in experiment 1, similar response properties were observed between the two stimulus series generated from the two original stimuli for each category. Therefore, all of the responses for each stimulus in the two stimulus series were averaged and graphs to clarify the relationship between the correct response rates and the shift of F_0.

Figure 4 illustrates the relationship between the stimuli and correct responses for each category. (A) is for the hunger stimuli. The correct response rates increased as F_0

increased for all three tempo conditions (from 43.7% to 60% for "unchanged", from 22.7% to 35.5% for "compressed", and from 53.6% to 70.9% for "expanded"). This tendency was most apparent and statistically significant in the case of the unchanged condition. Consequently, the F_0 dependency of the correct response rates was shown to be significant in chi-squared analysis, $\chi^2(6,\ n=55)=14.19,\ p<.05$. (B) shows the response rates for the anger stimuli. For the unchanged and expanded condition, the correct response rates increased significantly as F_0 increased (from 36.6% to 61.8% for

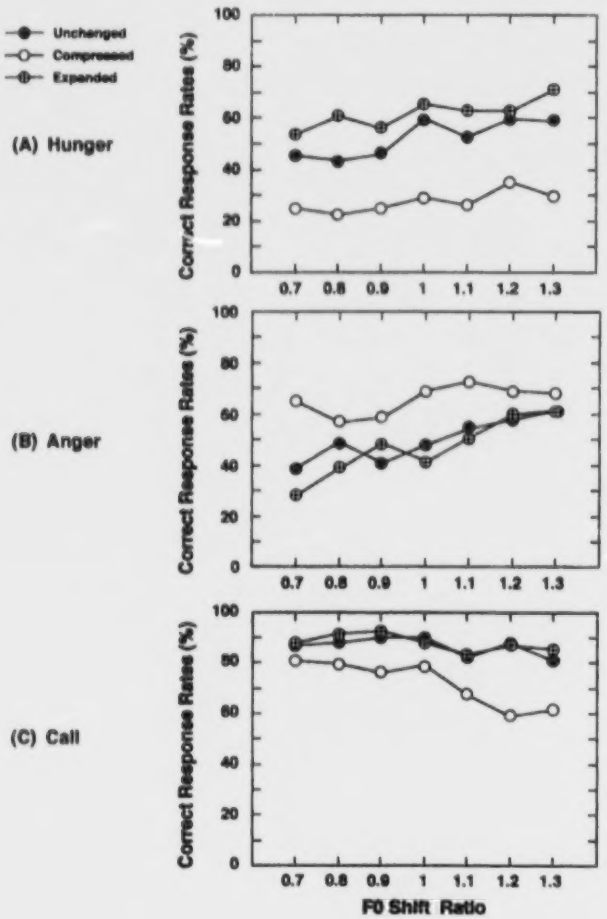

Figure 4 Relationships between correct response rates and the variations of F_0 in three tempo condition for three categories: (A) is for hunger stimuli. The correct response rates increased as F_0 increased for all three tempo conditions. (B) is for anger stimuli. The correct response rates for the unchanged and expanded condition increased as F_0 increased. For the compressed condition, the correct response rates were higher than for the other tempo conditions throughout the stimulus series, regardless of the F_0 shift. (C) is for call stimuli. The correct response rates for the unchanged and expanded condition were so high as to exceed 80% throughout the stimulus series, regardless of the F_0 shift. For the compressed condition, the correct response rates decreased at higher values of F_0.

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" unchanged " and from 24.7% to 61.8% for " expanded "). For the compressed condition, however, the correct response rates were higher than for the other tempo conditions throughout the stimulus series and the effect of F_0 shift was not significant. In chi-squared analyses, the correct response rates differed significantly with respect to F_0 for the unchanged condition ($\chi^2(6,\ n=55) = 19.03,\ p<.005$), and for the expanded condition ($\chi^2(6,\ n=55)=37.57,\ p<.001$). (C) shows the correct response rates for the call stimuli. For the unchanged and expanded condition, the correct response rates show similar patterns. They were so high as to exceed 80% throughout the stimulus series, regardless of the F_0 shift. For the compressed condition, however, the correct response rates were lower than for the other tempo conditions on the whole and also significantly decreased from 80.9% to 59.1% at higher values of F_0. In a chi-squared analysis, the correct response rates of stimuli for the compressed condition were significantly different with respect to F_0, $\chi^2(6,\ n=55)=27.2,\ p<.001$.

These results showed that the F_0 shift affected, on the whole, the correct response rates in all three categories. However, the response characteristics in each category showed that the effects of varying F_0 differ among the three tempo conditions.

Relationship between pitch and tempo

Examining the relationship between the pitch and tempo, the response characteristics among the three tempo conditions were analyzed by multiple comparison tests using Ryan's procedure. Analysis results showed significant differences ($p<.05$) as follows: For hunger, the correct response rates were highest for the expanded condition followed by the unchanged and then the compressed condition. There were significant differences between the unchanged and compressed condition ($\chi^2(1,\ n=55)=27.53$), between the expanded and unchanged condition ($\chi^2(1,\ n=55)=6.6$), and between the expanded and compressed condition ($\chi^2(1,\ n=55)=53.94$). For anger, a different tendency was observed. The correct response rates were highest for the compressed condition followed by the unchanged and then the expanded condition. There were significant differences between the compressed and expanded condition ($\chi^2(1,\ n=55)=39.32$), and between the compressed and unchanged condition ($\chi^2(1,\ n=55)=17.93$). For the call, the correct response rates were highest for the expanded condition followed by the unchanged and then the compressed condition. There were significant differences between the expanded and compressed condition ($\chi^2(1,\ n=55)=18.29$), and between the unchanged and compressed condition ($\chi^2(1,\ n=55)=15.69$).

The error responses in each tempo condition were also analyzed to reveal the response tendency of the subjects. The results showed that the category shifts depending on the tempo conditions were observed for the compressed condition of the hunger stimuli and the unchanged and expanded condition of the anger stimuli. For example, in the hunger stimuli case illustrated in Figure 5, the F_0 shift produced a minimal effect when the stimuli had a fast tempo due to compression (A). However, as can be seen (B), the F_0 shift had a clear influence on identification when the stimuli had a slow tempo due to expansion.

It is noted that this same tendency was also shown in experiment 1. For the call, when F_0 increased under the compressed condition, the correct response rates decreased

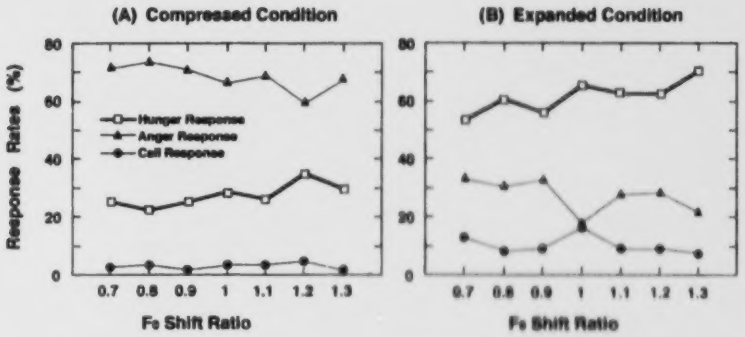

Figure 5 Response properties for hunger stimuli. Bold lines represent correct responses in two cases. The F_0 shift produced a minimal effect when the stimuli had a fast tempo due to compression (A). However, as can be seen (B), the F_0 shift had a clear influence on identification when the stimuli had a slow tempo due to expansion.

whereas the hunger responses increased (about 30%). However, there was no category shift, as can be seen in (C) in Figure 4.

These results suggest that, as far as the identification of hunger and anger cries is concerned, tempo is more influential than pitch, which might be used as a secondary cue when the acoustic features are atypical or indistinct. For the call cries, there were effects of tempo and pitch but these were not enough to cause a category shift. It is assumed that there might be other perceptual cues that are much more influential in recognizing call cries.

General Discussion

Little is known about the process of cry judgment, how the cries are perceive and then interpreted by the adult listeners. A number of studies on analysis and perception of infant cries, and even studies in the field of speech communication, suggested that the duration and the F_0 may be used as perceptual cues in judging infant cries. In this study, we focused on two acoustic features, the tempo and pitch, and examined how these acoustic features affect the category identification by using the three categories (hunger, anger, and call) of natural cries with a healthy infant when he was 12 to 15 weeks in age. In experiment 1, the effect of tempo was examined by manipulating the duration of the cries. In experiment 2, the effect of pitch by varying F_0 higher and lower in seven levels under three different tempo conditions (unchanged, compressed, and, expanded) were examined by manipulating the duration and F_0 of the cries. The results showed that differences of both the tempo and the pitch significantly affected the correct response rates in all three categories. However, the effects of pitch were different among three kinds of tempo conditions and responses of the subjects tended to depend on the tempo of stimuli. The effect of tempo by manipulating compression or expansion of the duration was quite consistent through the results of experiments 1 and 2, which indicates that tempo is more influential than pitch.

Several studies of cry perception (Bisping et al., 1990; Zeskind & Lester, 1978) found that the cries with a higher pitch were perceived as more unpleasant, urgent, or

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aversive and stressed that the F_0 may be the most important acoustic feature differentiated in the cries. However, these findings are related to the cries of high-risk or abnormal infants, which usually have a higher pitch (above 800 Hz, on average) than those of normal infants (ranging between about 300Hz to 500 Hz). Recently, experimental evidence related to our results mentioned above has been shown. Zeskind, Klein, and Marshall (1992) also examined the effect of duration of cries on adult listeners' perception using experimental manipulations of the cry sound. They digitally lengthened or shortened the durations of pauses and expiratory sounds in the cries and tested how these manipulations affected the perception of cries. They found that cries with pauses 50% shorter than the original were perceived to be more arousing, informative, and aversive. They also found that the monotonic effect of pause duration was enhanced in an interaction with expiration duration for perceptions of urgency. These findings indirectly support our findings that when the duration was compressed for the hunger stimuli, more than half of the responses were given as anger cries. That is to say, it can be concluded that an anger cry with fast tempo is related to the adult listener's perception of how arousing, aversive, and urgent it is.

However, we must pay attention to differences of cry stimuli used in each of our and their experiments: As the original stimuli, they used the hunger cries of a 2-day-old infant, while we used three types of cries (hunger, anger, and call) produced by an infant aged around three months. It is considered that our cry stimuli are composed of various acoustic features in general because the pattern of the cry as was described in the beginning of this paper. This comparative discussion between two kinds of experimental results, even though different stimuli with different manipulations are used in the two cases, leads us to believe that variations in the tempo clearly affected both the adult listeners' perception and their interpretations of the meaning of the cries.

Furthermore, it is important to note that the effects of the tempo and pitch were different among the three cry categories. Concerning the relationship between the acoustic features of the hunger and anger stimuli, as shown in Figures 1 and 2, they have rather similar distributions especially in F_0, which may cause these two categories to be easily confused. However, modification of cries by changing the duration and F_0 seemed to make it easier to discriminate between these two categories, assuming that by making such modification we could emphasize a distinctive perceptual feature. Here, the findings in speech perception as described by Scherer are of considerable interest (see Introduction in this study), that anger seems to be characterized by high pitch level and fast tempo, and also by Kitahara and Tohkura (1992) that temporal compression of a speech signal serves to provide neutral speech with the emotion of anger, and also that the intensity of the anger increases as F_0 becomes higher. For example, compression for the anger stimuli (i.e., with a faster tempo) might emphasize the perceptual degree of anger if the anger is characterized by a fast tempo, while expression for the hunger cries might emphasize the perceptual degree of non-anger. As far as the identification of hunger and anger cries is concerned, tempo is more influential than pitch, which might be used as a secondary cue related to the degree of intensity when the acoustic features were atypical or indistinct. Accordingly, it is possible that the subjects might identify the anger and hunger cry stimuli by using the same criterion by which they judge the emotional states of a communicator

in speech perception. On the other hand, the correct response rates for the call stimuli always remained high regardless of changes to the duration and F_0, except for the stimuli whose tempo was doubled and whose pitch was 30% higher than that of the original, but nevertheless were not enough to cause any category shiat. This indicates that there might be might be much more influential perceptual cues than tempo and pitch. It can be inferred from the response characteristics of the subject that the call cries may be perceived as quite different from the other two types of cries as well as from their acoustic distributions as shown in Figures 1 and 2. That is to say the call cries have an irregular temporal pattern, a lower pitch, and a narrow pitch range that are controlled by the manner of phonation and respiration by the infants. This may be derived from the fact that the call cries are based on the infants' psychological needs (demanding interaction and/or bodily contact with a caregiver), which are generally called "amae-naki" in Japanese culture. If these cries are the same as the "faking cries" described by Wolff (1969), the call cries must have some perceptual acoustic features that identify that the infants are faking the cry.

In this study, we focused on two perceptual acoustic features, tempo and pitch, which can rather easily be changed by manipulating the duration and F_0 of the cries by using a signal reconstruction method. Although this method is capable of modifying some acoustic features independently, we should know that it would be impossible to completely manipulate all the features independently because several features are, by their nature, dependent. For example, the temporal pattern of the F_0 (i.e., so-called pitch contour) must change so as to steepen the F_0's rise or fall when the duration is compressed linearly; the opposite effects exist when the duration is expanded. Thus, the possibility has to be taken into account that the experimental results given by manipulating the duration include a concomitant effect of F_0 change. Future research is needed to examine the effects of other segmental acoustic features such as formant transitions, pitch contours, and spectral envelopes. In order to manipulate these acoustic features in a sophisticated way, however, we still need to develop a high-quality cry synthesizer based upon a cry production mechanism for manipulating many more acoustic features independently and freely.

Taking the above discussion into consideration, though it is too early to conclude that the effects of pitch and tempo obtained experimentally can be generalized for the judgment of cries, the results of this study provide meaningful suggestions and a new view to the study of cry judgment. It is safe to say that future research will deal with segmental acoustic features, such as formant transitions and pitch contours. In order to manipulate these segmental acoustic features in a sophisticated way, however, we still need to develop a high-quality cry synthesizer based upon a cry production mechanism. This issue should also be discussed in further research. Additionally, new mechanisms will be necessary for infant cry judgment, in order to study the development of communication patterns between parents and infants.

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BILINGUAL CHILDREN'S LANGUAGE CHOICE IN TWO LINGUISTIC CONTEXTS*

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Abstract

Bilingual children growing up in homes where they are exposed to different languages used by each parent need linguistic input to acquire each parent's first language. However, such input from one parent may simply not be enough under circumstances where each parent's consistency in his/her language choice varies greatly. Differences and similarities in patterns of children's language choices in different contexts may illuminate an essential component of bilingual children's linguistic behavior as it is related to patterns of parental input practice.

This paper examines discourse samples from two bilingual families. These samples were drawn from longitudinal case studies of four children growing up in English/Japanese-speaking families living in the US (Kasuya, 1997). Discourse samples to be analyzed here were collected during mother-child dyadic free play and at family mealtimes at two time points when the children were 3;6 and 4;1. First, the absolute and relative frequencies of the languages used by the parents and children in the dyadic free play and mealtime contexts are shown in order to see if there are any differences between the two mothers' input in the minority language (Japanese) which might help account for the children's language use. Then the children's language choice is investigated by focusing on the children's initiations in English or Japanese when they addressed each parent in either context. The findings suggest important implications for the extent to which the linguistic input pattern in the home should emphasize the minority language.

Key Words: bilingual children, language chice, parental input, different linguistic contexts discourse samples

Introduction

It is fairly obvious that if a child is to acquire a given language, he or she must have ample opportunity to hear that language as well as to engage in communicative interactions with an interlocutor. Parents of the child then can play a significant role in young children's language development. Researchers are, however, still not in agreement

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on what minimum absolute frequency of input is required in order for young children to be able to learn to speak a language. Bilingual children growing up in homes where they are exposed to different languages used by each parent also need parental linguistic input to acquire each parent's first language but such input from one parent may simply not be enough under circumstances where each parent's consistency in his/her language choice varies greatly. The relative frequency differences between the input of the two languages have an effect on children's language choice, as Pearson and others (1998) point out. A rich language environment, which features plenty of input in each of two languages, seems to be one of the important factors which separates success from failure in raising children to be active bilinguals (Arnberg 1987; De Houwer, 1998; Kasuya, 1998; Saunders, 1988; Taeschner, 1983).

In such a bilingual environment, however, children do not seem to use two languages all the time. Similarly, a stylistic choice in monolingual situations is made only for specific contexts in daily interactions with others. There are different contexts such as dyadic free play with a mother who speaks language A as well as multiparty mealtimes with both parents where language A as well as language B are used. The former context tends to induce more monolingual conversation adhering to one language only and the latter more bilingual interactions involving switching languages with each parent (Lanza, 1992). Differences and similarities in patterns of children's language choice in such different contexts may illuminate an essential component of bilingual children's linguistic behavior as it is related to patterns of parental input practice.

In this paper, therefore, I examine discourse samples from two bilingual families. These samples are drawn from longitudinal case studies of four children growing up in English/Japanese-speaking families living in the US (Kasuya, 1997). First, I present the absolute and relative frequencies of the languages used by the parents and children in two contexts (dyadic free play with a Japanese-speaking mother and family mealtimes with both parents) in order to see if there are any differences between the two mothers' input in Japanese which might help account for the children's language use. Then I examine the children's language choice by focusing on the children's initiations in English or Japanese when they are addressing each parent in either context.

Method

Subjects

The two male subjects in this study are first-born preschool children from English-Japanese bilingual families in which the father's first language is English and the mother's Japanese. The parents of the two families claimed that they had practiced the "one parent/one language" input model but with different degrees of adherence. For the children, exposure to Japanese, which was not the societal language, was mainly limited to the home. The mothers were bilingual and the fathers were fundamentally monolingual with some production capacity in Japanese.

Procedure

Discourse samples to be analyzed here were collected at two time points when the children were 3;6 and 4;1 during mother-child dyadic interactions (e. g., free play and

lunch time talk) as well as family mealtimes with both parents present. The last 30 minutes of each interaction at the two time points were used for the analyses in this paper. All the discourse samples were fully transcribed. Each transcript was divided into utterances based on intonation contours. All transcripts were formatted according to the CHILDES (Child Language Data Exchange System) method (MacWhinney, 1995; MacWhinney & Snow, 1990). For the Japanese utterances, the JCHAT (Japanese Codes for the Human Analysis of Transcripts) format was used (Oshima-Takane & MacWhinney, 1995).

Coding

To assess language choice, I coded all child and parent utterances according to language type—1. an utterance containing only Japanese (J), 2. only English (E), 3. at least one morpheme from each of the two languages (Mixed), or 4. an utterance attributable to either or neither language (Non-language specific). Since Non-language specific utterances were mostly onomatopoeia, sound effects, or unintelligible speech, they were excluded from the analyses in this study. Also, although many loan words or words borrowed from English have been incorporated into Japanese, these are usually pronounced in the Japanese way and used by monolinguals who do not know any English. The decision as to whether a word was English or not was, therefore, generally very straightforward.

The addressee and the language of the immediately previous utterance have been reported to be the major factors in a child's language choice (Fantini, 1987; McClure, 1977; Saunders, 1988; Taeschner, 1983). To test this in the two contexts, I further coded the child's utterances when addressing the parent for conversational move—initiation, response, or other. The language of child initiations tends to be less constrained by the language of the immediately preceding adult utterance and more constrained by the addressee, while for child responses, a category which will not be addressed here, the opposite should be true. In many cases children's initiations were used to initiate a conversation or interrupt an on-going conversation (e.g., attention-getters such as "Mommy, look" and "See?") and to ask questions such as requests for information or confirmation (see Appendix for an example of a coded transcript).

Coding reliability

An independent bilingual rater coded 20% of the data to see whether the coding schemes for language type and conversational move were reasonably reliable. Cohen's kappa statistic (Bakeman & Gottman, 1986) was used to calculate inter-rater reliability, correcting for chance agreement between raters. Cohen's kappa for the language type coding was .97 and for the conversational move coding .82, both well above acceptable levels.

Results

Languages used in the two contexts

The findings presented in Tables 1 and 2 show that the frequency of the mothers' use of Japanese in both contexts is different and that this input factor might be associated with

Table 1 Languages used by the children and the mothers (%)

	ENG	JPN	MIX	Total number of utterances
Ray	76.0	19.6	4.4	342
Mother	31.6	67.6	0.8	136
Sho	45.6	49.1	5.3	753
Mother	4.0	92.9	3.1	326

Table 2 Languages used by the children and the parents in mealtimes (%)

	ENG	JPN	MIX	Total number of utterances
Ray	88.4	7.9	3.7	190
Mother	40.0	57.8	2.2	135
Father	87.7	10.5	1.8	171
Sho	52.6	40.4	7.0	285
Mother	9.5	87.8	2.7	262
Father	86.0	7.4	6.6	136

ENG = English JPN = Japanese MIX = Mixed utterances

the children's choice of language. Even in a Japanese-context which was an interaction with only a Japanese-speaking parent, Ray's mother's use of Japanese represented 67.6% of the total number of utterances, while the figure for Sho's mother was 92.9%. Accordingly, Sho used Japanese (49.1%) more than twice as often as Ray (19.6%) in a Japanese context and 5 times more often (40.4%) than Ray (7.9%) in a bilingual context (family mealtimes). Also, considering absolute frequency of language input, Ray's mother talked much less than Sho's mother in both contexts.

As for linguistic input patterns at mealtimes, the two families are different as well. In Ray's family, Ray's proportional use of English (88.4%) was much higher than his use of Japanese (7.9%), which is similar to his father's pattern (87.7% for English and 10.5% for Japanese), while Ray's mother's relative frequency of use of the two languages was more balanced than that of the other two members of the family (40.0% for English and 57.8% for Japanese). In Sho's family, however, the parents seemed to practice the 'one parent/one language' input pattern fairly consistently as the patterns of relative frequency of use of the two languages when comparing the parents are quite inversely proportional (mother, 9.5% for English and 87.8% for Japanese; father, 86.0% for English and 7.4% for Japanese). Sho's proportional use of Japanese (40.4%) was a little lower than that of English (52.6%) but much higher than Ray's use.

Child initiations

I have found that both parents and children studied spoke two languages, with English being the dominant one in Ray's family and with an approximately equal amount from two languages in Sho's family. These findings, however, do not indicate which

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Table 3 Child's language choice in initiations in interaction with the mother (unit=utterance)

		Mother
Ray	Initiation in ENG	158 (89.3)
	Initiation in JPN	19 (10.7)
	Total	177
Sho	Initiation in ENG	236 (61.8)
	Initiation in JPN	146 (38.2)
	Total	382

Table 4 Child's language choice in initiations in mealtimes (unit=utterance)

		Mother	Father
Ray	Initiation in ENG	49 (92.5)	42 (97.7)
	Initiation in JPN	4 (7.5)	1 (2.3)
	Total	53	43
Sho	Initiation in ENG	31 (47.0)	22 (91.7)
	Initiation in JPN	35 (53.0)	2 (8.3)
	Total	66	24

ENG=English JPN=Japanese (%)
Total=Total number of Initiations

language the child chose when he addressed each parent; these utterances were categorized as child initiations. Child initiations presented in Tables 3 and 4 are the utterances in English or Japanese which are clearly not responses to the previous utterances and are immediately followed by the parents' responses.

Ray initiated mainly in English in both contexts (89.3% for a Japanese context; 92.5% for a bilingual context), whereas his proportional use of Japanese initiations was a little higher in a Japanese context (10.7%) than in a bilingual context (7.5%) when he was addressing his mother. This proportional use of the two languages is quite natural and expected because of the nature of the participants in each context. Sho's relative frequency of initiations in Japanese, however, did not follow the same pattern and his proportional use of Japanese initiations was higher in a bilingual context (53.0%) than in a Japanese context (38.2%). Sho seemed to differentiate between the roles of each parent by choosing the father's or mother's language in interacting alternately with both parents, while he might have been careless about this distinction when he was only with the mother. Nevertheless, Ray's preferred language was English regardless of the addressee, while Sho's preferred language was determined by the person to whom he spoke, although he still used quite a lot of English with his Japanese-speaking mother.

Furthermore, the total number of English and Japanese utterances in initiations addressing two parents during mealtime conversation was 96 for Ray and 90 for Sho, which accounted for about a little less than half of all Ray's utterances and a little more than one third of all Sho's utterances. Considering that Sho talked more than Ray, it could be speculated that Ray's turns were shorter because they were produced in the

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context of a dialogue, with alternate utterances from the child and parent, while Sho's were longer and more resembled a monologue without parental interruption. Of course there were some other factors to explain this such as frequency of responses to each parent. The following excerpts (Examples 1 and 2) show such different discourse patterns.

Example 1: Ray's family at the dinner table (Ray, 3;6)

1 Mother: Kyo, ojii-chan kara denwa attamon ne, Ray?
Eng: You got a phone call from your grandpa today, didn't you, Ray?
2 Ray: Ojii-chan ...
Eng: Grandpa...
3 Father: What did your grandpa say, Ray?
4 Ray: He's fine.
5 Mother: Hokani wa nante itteta?
Eng: What else did he say?
6 Ray: He's gone.
7 Mother: He's gone?
8 Ray: He's gone xxx to pick up the mail.
9 Mother: Did he say that?
10 Ray: (Looking at the plate) # I want grapes.
11 Mother: Moo ii wa, Ray
Eng: That's enough, Ray.
12 Ray: want grapes.
13 Mother: Ray, mama said no.
14 Ray: 0 [making noise].
15 Father: Ray, man, stop it.
16 Mother: Honey, no more no more, takusan tabetaja nai moo.
Eng: you had enough already.

(utterances in bold face = Initiation)
xxx = unintelligible speech, # = pause

In Example 1, Ray's mother used Japanese for the first two utterances (lines 1 and 5). Then she switched to English (lines 7 and 9) except for a short utterance in Japanese (line 11) and a mixed utterance (line 16) at the end. Ray started to say something in Japanese at line 2 but this was an incomplete utterance which sounded like a repetition of a part of his mother's utterance. In Ray's family, family terms such as ojii-chan (grandpa) and obaa-chan (grandma) are often used to distinguish Japanese grandparents from American ones. He used all English for the rest of the conversation. In line 10, instead of replying to his mother's question, Ray initiated a new topic in English. He also repeated his own initiation utterance at line 12. This example shows shorter turns; that is, alternate utterances from the child and parent. Such a discourse style continued to be observed when he was 4;1 as well.

Example 2: Sho's family at the dinner table (Sho, 4;1)

1 Mother: (Bringing tea) Sho, kore atsuikara ne.

Eng:	Sho, this is hot, you know
2 Sho:	**What is it?**
3 Mother:	O-cha.
Eng:	Green tea
4 Sho:	**I like o-cha.**
5 Mother:	Soo, dozo, demo ki o tsuketene, atsui kara.
Eng:	So have some, but be careful, okay, 'cause it's hot.
6 Sho:	I know, you said it already.
7 Father:	Sho, remember mom said the same thing before? xxx you know but you still knocked it over, didn't you, remember?
8 Sho:	No, I didn't. Mom had ... lots of o-cha and xxx I got one of them. Mom said it's hot it's hot and it was not. Then something and ... xxx uh I drank it.
9 Father:	Then you knocked it over.
10 Sho:	No, dad.
11 Mother:	Sho-kun sa, yoku kobosukara ne, oboeteinan ja nai no?
Eng:	Well, Sho, since you knocked things over very often, you don't remember it, do you?
12 Sho:	Oboeteru yo, itsumo.
Eng:	I remember always.
13 Mother:	Soo, (pointing at the noodle plate) ja kore totte ageyou ka?
Eng:	Yeah, well, do you want me to get this for you?
14 Sho:	**Boku nuudoru suki damon.**
Eng:	I like noodles.
15 Mother:	Hai, soo ne.
Eng:	Yeah, right.

By contrast, in Example 2, Sho's mother used Japanese all the time. Sho used Japanese twice: once in line 12 Japanese was used as a response in a protest against the mother's comment on his forgetfulness while the other is in line 14, an example of initiation. The word, "nuudoru", is a foreign loan-word from English, which Sho pronounced somewhat differently from the English word, noodle. It is interesting to see that he used English one time (line 4: I like ...) and Japanese the other (line 14: ... suki damon) when he expressed his preference while addressing the same person. Line 8 is an example of a monologue that Sho produced. In CHAT (Codes for the Human Analysis of Transcripts) formatting (MacWhinney, 1995), line 8 consists of four separate utterances. Sho's turns were longer and more resembled a monologue, a pattern which was often observed even when he was 3;6.

Discussion

Parents in bilingual families admitted that they used the non-native language because of extralinguistic variables such as the number of other people who were present while the parent was addressing the child, the languages they spoke, the linguistic context in which a given conversational topic occurred, and the parent's degree of fluency in each

language (Goodz, 1994). For instance, a Japanese-speaking mother, alone with her child, typically spoke entirely in Japanese (monolingual context), switching to English only if English speakers were present. This was particularly the case if the mother's fluency in English was superior to the Japanese competence of the others present, which is most likely the case in the US. In this context, when the mother is alone with the child, however, the child seems to be more encouraged to use only an addressee's (mother's) preferred language than in interactions with more than one parent as long as the addressee keeps using that language.

In contrast, family dinnertime is one of the few regular time frames for a bilingual and intergenerational gathering in which children can both listen to adult talk and participate in collaboratively produced discourse. This situation induces switching languages depending on who is being addressed. It can be speculated through referring to other studies (Fantini, 1987; Lindholm & Padilla, 1978; McCulre, 1977; Saunders, 1988; Taeschner, 1983) that the addressee could be one of the major factors in determining a child's language choice. However, the present study does not confirm that a single parameter seems to be capable of predicting language choice consistently.

Although both Sho's and Ray's language preference when addressing either parent appeared to be English at most times, the results have shown some differences between the two children's language choice; one difference is that the child of the mother who was less talkative and who used less Japanese showed very low relative use of Japanese in addressing the mother in both contexts. On the other hand, the child of the mother who was more consistent in using Japanese used more Japanese than English in addressing the mother in mealtime conversation but used more English than Japanese in dyadic interaction with the mother. It should be noted, however, that these interpretations assume a bidirectionality between mother and child: that is, it may be that the mother of the child who used less Japanese had been discouraged from using Japanese by the child's language choice rather than the other way around where the child had been discouraged from using Japanese by the mother's use of English.

In conclusion, the findings suggest important implications for the extent to which the linguistic input patterns in the home should emphasize each of the two languages to which the child is exposed. The results also showed a great difference between the two families in the amount of talk in 30 minutes of dyadic interactions and in mealtime conversations at the two time points. Differences in the parents' interactional styles as well as factors related to the children's personalities need to be addressed further to account for this difference. These particular children's acquisition of Japanese is associated with traditional values or seen as an "extra" skill and not immediately associated with educational achievement and social and economic mobility, according to the parental reports. This attitude regarding language and language learning may also affect young children's bilingual acquisition (Ochs & Schieffelin, 1995).

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Appendix

Example of a coded transcript

Mother (MOT) and child (CHI=Sho, 2;11) are talking about a picture book

*MOT: okaasan wa nani siteru no kore?
%lan: $J
%eng: what is the mother doing here?
*CHI: coffee.
%lan: $E:R
*MOT: koohii ne.
%lan: $J
%eng: coffee, isn't it
*CHI: yeah.
%lan: $E:O
%com: saying softly, backchanel
*MOT: otya nonderu no otya ne.
%lan: $J
%eng: she's drinking tea, tea indeed.
*CHI: I-'ll try+...
%lan: $E:I
%act: looking at mother
*MOT: soo otya tte ieru?
%lan: $J
%eng: yeah, can you say tea?
*CHI: a: tya xxx.
%lan: $NL
*MOT: otya otya tte tea no koto desyoo.
%lan: $J
%eng: tea, otya means tea, doesn't it?
*CHI: I want otya.
%lan: $M:I

%lan=language type, %eng=English translation, $J=Japanese; $E=English; $NL=Non-language specific; $M=Mixed, second level codings; :R=Response; :I=Initiation;; O=Other, xxx=unintelligible speech, for other symbols and morphemicization rules, see MacWhinney (1995) and Oshima-Takane & MacWhinney (1995).

SEX EDUCATION IN CHILDREN AND CHILDREN'S FANTASY ABOUT SEXUALITY

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Abstract

Sex education is provided in Japan from early childhood. This article presents the psychoanalytical considerations on the supposed discrepancies between children's fantasies about sexuality and the information given in sex education. On one hand, such education has to provide preschoolers with biologically and anatomically correct knowledge. On the other hand, this sort of 'scientific' education must not restrain the preschooler from thinking creatively about his or her own sexuality. From a psychoanalytical viewpoint, the preschooler's thoughts regarding sexuality during the oedipal phase contributes largely to the preschooler's subsequent gender development. Their fantasies, which are triggered by questions regarding his or her own existence and sex, constitute the answers to the aforementioned questions. It is emphasized here that the child's fantasies should be respected and incorporated into his or her education. In the following article, a number of picture books are analyzed as educational tools that respect the child's fantasies about sexuality. And also the "Schreber case", a case of a psychotic, whose autobiography has been largely analyzed by many psychoanalysts, is discussed as a consequence of restriction of his childhood fantasies on sexuality and existence.

Key Words: sex education, questions, fantasies, sexuality and Existence

Sex education reconsidered

In Japan, as in western developed countries, sex education is provided for children at an extremely low age. This educational enlightenment which provides children with a variety of themes such as the "reproduction act", "sexual difference", "gender roles", "delivery" etc. Seems to exert strong influences upon children even at kindergartens. There are a variety of reasons for this educational policy. The most influential one is probably the fact that the age at which young people are experiencing sexual intercourse has become lower than ever. In addition, many junior high and high school students have become involved in varying forms of prostitution, which spreads sexually transmitted diseases, including AIDS, among young people. Sexuality and its risks are much closer to young people than ever before.

Generally, the purpose of sex education is to make pupils responsible for their own

sexual behaviors. Educators are supposed to teach them the "correct and accurate" knowledge and fair attitude toward sexuality. It is "scientific knowledge" that is needed for children to achieve the educational goal. Scientifically accurate information is indispensable in sex education, but sex education that is free from scientific basis must also be allowed for young children. This is not because children are too innocent to think about sexuality, but because at the age of about three to five, they themselves begin to spontaneously ask about gender difference and the origin of babies by building fantasies on them. Although their thoughts on sexuality may be filled with wild and preposterous ideas, they deeply affect later mental development. Freud wrote about sex education in *Analysis Terminable and Interminable* (1937):

> I am far from maintaining that this is a harmful or unnecessary thing to do, but it is clear that the prophylactic effect of this liberal measure has been greatly over-estimated. After such enlightenment, children know something they did not know before, but they make no use of the new knowledge that has been presented to them. We come to see that they are not even in so great a hurry to sacrifice for this new knowledge the sexual theories which might be described as a natural growth and which they have constructed in harmony with, and dependence on, their imperfect libidinal organization-theories about the part played by the stork, about the nature of sexual intercourse and about the way in which babies are made. For a long time after they have been given sexual enlightenment they behave like primitive races that have had Christianity thrust upon them and who continue to worship their old idols in secret (233-234).

As discussed above, children are unable to discard common myths such as storks bringing babies and so on. From the viewpoint of psychoanalysis, this shows that it is *absolutely necessary* for them to have the opportunity to think about sexuality, examine it, and fantasize about it. If children are deprived of this chance, we can assume that his or her gender identity or cognition of sex and sense of being will be distorted. For example, when they are personally confronted with questions like "What does it mean to become a father, not merely being a man?" or "What is a woman?" they have problems with fulfilling these new roles, since they had not attained the identity of sexually typed beings in the early childhood.

Therefore, educators engaging in sex education should respect children's creation of fantasies. In order for us to respect children's fantasies, it is necessary to know their content and structure.

Fantasies as answers to the enigma of existence

According to Freud (1905), the origin of knowledge in infancy is the question of sexuality; "...we have learnt from psycho-analysis that the instinct for knowledge in children is attracted unexpectedly early and intensively to sexual problems and is in fact possibly first aroused by them."(*Three Essay on Sexuality*, p.194) The earliest and central question of children in this regard is where babies come from (Freud, 1905, p.195). It is easily recognized that the sexual question and the ontological question are expressed in one

form. It means that for children these two questions share the same nature.

Freud's theories are strongly criticized by many psychologists because they seem to lack empirical methodology. It is not my purpose to protect Freud's theory against this criticism. However, I will try to give a concrete form to the discussion developed here that is based on empirical and clinical facts.

Let us first take some examples of sexual and ontological questions posed by children. In *Juvenile language* (1987), the following conversation is reported.

> Boy (three-year-old) : Mommy, if only I could have a baby!
> Mom : So how are you gonna have a baby?
> Boy : If I eat lots of cooked rice, my tummy will get big (p.41).

The curious theory proposed by this boy is not so unique. It is often observed that many children who think "people get babies by eating some particular thing (as they do in fairy tales) and babies are born through the bowel like a discharge of feces."(Freud, 1905, p.196) This kind of idea sometimes reappears in neurotic fantasies as reported by clinical psychologists. Feces in dreams or fantasies turn out to mean "child","giving" and "money" in the unconscious. Conversely, this distorted expression used by neurotics is premised on childhood fantasies.

Another question related to the above mentioned one concerns the penis. What does it mean when children are very sensitive to whether he or she has a penis or not? Let us consider this point using other examples from the same book.

> Girl (three-year-old) : Why does my older brother have a penis? Will mine come out when I grow up?
>
> Boy (two-year-old) : Don't you have a penis?
> Mother : Mom does not have one, dear.
> Boy : Why don't we go buy a penis?

The child of the first case is said to have the same sex theory as the Hans' theory, analyzed by Freud in his *Analysis of a phobia in a five-year-old boy* (1909).

> Hans (about three-year-old) : Mummy, have you got a widdler [penis] too? (Freud, 1909, p.7)
>
> (In seeing seven-day-old little sister being given a bath. Hans was three and a half years old) Hans : But her widdler's still quite small... When she grows up it'll get bigger all right."(Freud, 1909, p.11)

These children's curious ideas concerning the penis are based on the assumption that everyone has a penis. According to Freud, girls think that their penis was taken away by someone. This is a well-known notion of the "penis envy" theory, criticized by many psychologists and psychoanalysts. The reliability of this notion cannot be discussed in this

article, but we have to bear in mind that the idea is one of the possible fantasies built by children. In this sense, it is not so important for us to criticize it. Instead, the purpose here is to figure out what is at issue in the fantasies about the penis and penis envy.

In the course of the exploration concerning the existence of a penis, children try to explain why he or she has/doesn't have a penis. Shingu (1995, p.284-287) pointed out when faced with the enigma of presence or absence of a penis, infants do not think that it happened to be or not to be there by sheer "chance". After finding a penis, they try to examine the ground or inevitability of the presence-absence of a penis in a logical and ethical way. The process of their thoughts is regarded as follows.

Children explore the problem not only about the penis but also about the origin of his or her being. According to Shingu, "children solve this critical problem as follows: there is someone who can attach a penis on one child and not on another...This person must give me the reason, as an inevitable reason, of this way of being as I am, and not that way."(1995, p.287) In other words, children ponder sexual problems and ontological problems to eventually conclude that there is someone who can choose other people's sexual difference and being with discretionary powers. On this point, let us take an example analyzed by Melanie Klein (1921).

Fritz, four-year-old boy, asked his mother the following questions:

"Where was I before I was born?"

"How is a person made?"

"Mamma, please, how did you come into the world?"

To these questions, his mother "answered absolutely truthfully and, when necessary, on a scientific basis suited to this understanding, but as briefly as possible"(p. 3). On the other side, his nurse and his elder brother said to him that "the stork brought the babies and God made people"(p.4). Fritz was not content with these answers.

In spite of his mother's "right" answers, he did not stop asking about the existence of human beings and things in the world. He asked, "'Does God know for certain how long he will let it rain?'". To this question, his mother answered that God did not exist and the rain came from the clouds (p.6). It is very likely that the question is philosophical in nature. He did not ask for scientific explanation, but for ground or inevitability of his existence. That is why he could not stop asking questions in spite of the many answers he had received. It can be regarded as a philosophical question. Here the term "philosophical" is not an exaggeration. What is at work in the thought process of children is the logic that resorts to things that already exist in order to infer the cause of existence. This method is the same as the "*demonstratio quia*", which is used by St. Thomas in his proof of the existence of God. Relying on this method, children fantasize that a penis or a child's existence is something, which may not exist, i.e. *possibilia et esse et non esse*. A final ground of this *possibilia et esse et non esse* is God, which is *per se necessarium*, which means, "what in itself inevitably exist". Children's engaging the question of sexuality and existence in the end reaches the same sort of conclusion, as Shingu said. The following is an another example, which metaphorically expressed this process of thought.

"'Mamma, you make kakis [feces] too, don't you?' When she agreed, he remarked, 'Because if you didn't make kakis nobody in the world would make them, would they?'" (Klein, 1921, p.10). Fritz noticed the fact that he was the creator of his own

feces, as his mother bore him. The utterances made by Fritz are based on the idea that something must be made by someone. By way of the investigation of his feces, he tried to understand the origin of himself or the inevitability of his own being. In this sense, his process of thought contributed to solving his existential angst aroused by those questions.

On the contrary, as has been mentioned above, what kind of consequences are expected if these fantasies are restricted in infancy? I hypothesize that if a child does not have a chance to deal with the question by him/herself, he or she will be distressed by the same question later on. Let me explain in detail.

Our sense of sexuality and existence is sometimes challenged by a crisis in life, such as the birth of a son, abortion, the death of parents, or impotency. In the face of these traumatic events, we are forced to " re-question " our sexuality and our existence in some way or another. This process is a re-considering of questions that have been already asked and answered in childhood. Sometimes we " re-question " via symptoms, like hysteria. Sometimes we " re-question " in dreams, using symbolic language, in which " feces " represents " gifts " and " child " for example. In contrast, if one has not had a chance to question and make fantasies in childhood, he or she has to *form these questions in adulthood.* The case of Schreber illustrates this point.

The Question about Sexuality and Existence in the Case of Schreber

Daniel Paul Schreber (1842～1911), a German lawyer, wrote the book titled *Memoirs of My Nervous Illness* (1903), in which he discussed his experiences caused by his mental disease. His purpose in writing the book was first to tell his wife about his experience of " religious truth ", but later he decided to publish it in order to let people after him scrutinize his experience. Once it was published, every exemplar was bought by members of his family. Freud analyzed Schreber's psychopathology in *Psycho-Analytic Notes upon an Autobiographical Account of a Case of Paranoia (Dementia Paranoides).*

Schreber's father, Daniel Gottlieb Moritz Schreber, was a famous doctor and educator. Freud wrote about him as follows:

> " Now the father of Senatspräsident Dr. Schreber was no insignificant person. He was the Dr. Daniel Gottlob Moritz Schreber whose memory is kept green to this day by the numerous Schreber Associations, which flourish especially in Saxony ; and, moreover, he was a ***physician***. His activities in favor of promoting the harmonious upbringing of the young, of securing co-ordination between education in the home and in the school, of introducing physical culture and manual work with a view to raising the standards of health—all this exerted a lasting influence upon his contemporaries. " (p.51)

It is conceivable that his father educated his children commensurate with his ideal of education. For example, the father " innovated " the prescription to stop a child's spermatorrhea. It is reasonable to suppose that Daniel Schreber received some of these prescriptions in his childhood. The following passage shows that the father tried to exclude sexuality from education.

> When the time draws near for the boy's approach to manhood it is the unavoidable duty of the parents or guardians to cut off the many dangers of chance or casual acquaintanceship with sexual relationships...Experience proves that by far the largest number of those who have succumbed in one way or another to *lust*, have sunk to this state by dint of their original ignorance of the dangers...(1858, p.251, cited from Ishibashi, 1986, p.66)

Schreber's father obviously was unaware of the fundamentality of questions on sexuality children are faced with. Schreber confessed in his *Memoirs* as " Few people have been brought up according to such strict moral principles as I, and have throughout life practiced such moderation especially in matters of sex, as I venture to claim myself. " (Ishibashi, p.66-67) Up until the onset of his psychosis, his attitude toward sexuality can be characterized not only as " moderate " but also as " unattainable "

According to Lacan, Schreber's wife had aborted several times. His mental illness began after his wife's repeated abortions. It is likely that his wife's miscarriages led him to questions such as " where the baby comes from " or " what is the role of the father in bearing a baby " which had never been asked until the onset of his mental disease. We should transform these questions into a more sophisticated form : " what it is to be a father in the sense of procreation " which Lacan (Lacan, 1993, p.292-293) formulated in his analysis of Schreber's illness. In short, we suppose that his psychosis started with the onset of his questioning about sexuality and existence. The appearance of the questions in adulthood unveiled the ungrounded nature of his sex, existence and the world around him. We can see this in the following delusive confession in his book:

> My delusions of loss of intellectual power are so strong and the degree of the impression of my dumbness so high that it appears doubtful anew day by day whether I still know the persons near me, or whether I still have a grasp of the usual natural phenomena, works of art, tools, other occurrences. It appears even doubtful whether I still know who I am or who I used to be (Schreber, 1903, p.179).

Schreber's theorizing should not be regarded as the incomprehensible delusions of a psychotic. Close reading of the book shows that its main theme is the question of sexuality and existence. Let us confirm this point. In the preface and the first chapter of the book, Schreber examines the origin of the universe. He questioned whether the universe originated without God, or in creation by God. To this question, he gave an answer as follows ; " The full truth maybe lies (in the way the fourth dimension does) in a diagonal of both directions of imagination that is not graspable by human beings " (Schreber, 1903, p.6).

However, his way of answering the fundamental question of existence and sexuality could not be conclusive, as the God of his religious theory was not capable of understanding living men. Freud stated that by characterizing God as ignorant of living men, Schreber accused his father of ignorance of him (p.322).

For us, Schreber 's characterization of God represents a lack of the transcendental other

as a *per se necessarium* which sustains the inevitability of his existence in his delusive theory.

In addition to the crisis of his existence, his sense of sexuality was also distorted. In delusion, his sex became female. Whereas Freud analyzed that this represents Schreber's wish, " if I was a female, I can bear a child ", we follow Lacan in interpreting Schreber's feminization to be an incomplete answer to the question of " what it is to be a father in the sense of procreation ", which is a reformed question of children.

The case of Schreber illustrates that children's questions on sexuality cannot be satisfied by scientific knowledge alone as they are existential and ontological in nature.

I have thus far discussed the importance of the questions of sex and existence in childhood. What needs to be emphasized at this juncture is that education is sometimes authorized only by science, as in the case of Schreber's father. If an authorized person stops a child's questioning by giving him or her the supposed " aptitude treatment ", the child cannot engage in establishing sex-typed-consciousness and certainty of his existence in the world, that is, the innermost self-consciousness.

But, how should we remedy the dilemma of having to teach scientifically correct knowledge to children and at the same respecting their spontaneous questioning ? In order to provide children with acceptable answers on sexuality we have to assist them in their creation of fantasies before a scientifically based education can set in.

Children's fantasy and picture books about sexuality

Before showing how we can help children to create fantasies, it is important to point out the basic ideas of sex education today. Kitazawa (1981), a prominent figure in early sex education in Japan, stated her ideal and teaching guideline in *Opened Sex Education for 1-3-year-olds to 9-year-olds*. Let us examine her opinion. First, as to the period of sex education, she argues that it is suitable for us to start depending on the child's developmental phase of cerebral growth. What she calls " the phase of creation " stands for the phase past age three. In this stage children ask " the question about the creation of his or her life ", as well as questions like " where do babies come from " and " Who made me ? " According to Kitazawa, the beginning of the thirst for knowledge is rooted in " the growing complexity of the connection of brain cells ". In this sense, this stage of development is called ' the phase of creation '. Whereas I recognize the importance of cerebral maturation for human beings to begin their questionings, it seems to me that the question about sex and existence posed by children at that age should be viewed in relation to infants' mentality rather than their brains.

As to the dilemma between science and children's fantasies, Kitazawa resorts to a kind of balanced sense. " In the case of little children, it is important for us to plow ahead with education not only scientifically, but also emotionally, like a wheel "(p52). However, I doubt that her educational idea is really based on this balanced sense, as it is not reflected her recommendation of picture books. In valuing three picture books on the birth of babies, she states, " The Japanese picture book is liable to ignore scientific grounds and float in emotion. Contrary to this, the Danish book (Knudsen, 1971, *This Is How to Make a Baby*) is thoroughly scientific and anatomical. As to the English one, it shows wealth of wit and the scientific nature mists over in them ", and " I value the Danish

book highest among the three. The author of this book put his heart and soul into giving scientifically sound explanations, keeping sentences and illustrations plain and excluding an unnecessary plot and embellishments."(p.92) In my understanding, science has a priority over "emotion" in her selecting of picture books. As far as picture books are concerned, it seems to me that it is neither "emotion" nor "science" that is most important. Based on our analysis, we value books that express infantile fantasies on birth and sexuality in direct or indirect ways. Let me take some examples.

"*Where are Your Navels, Little Frog?*" (Sakura, Shiota, 1988) is the tale in which the frog brothers are struck by lightening. On finding them, a pig exclaims, "your navels are gone!" It is a common Japanese superstition that navels are taken away by a thunderstorm-demon. In the course of the frogs' search for navels they find that the other animals all have navels and the frogs envy them. The value of this picture book lies in the fact that it allows for many interpretations by children. The frogs' lack of a navel may be interpreted as an expression of the question about the origin of their existence. It is thought that the lost navels are simultaneously connected with the fantasies about the penis. It is also impressive that on the cover of the picture book, the Japanese Oni, a demon, looks down on the frog brothers, who anxiously think they are deprived of their navels by the Oni. In addition, this Oni may be corresponding to "the being who does or does not attach phallus to children", about whom a small child dreams. Therefore, this book will stimulate children to make imaginations and fantasies about their existence in the unconscious. It is suitable for us to share these fantasies together with children by reading books like this one.

Other books, "*Where did I come from?*" (Peter Mayle, 1973) and "*Mommy Laid an Egg!*"(Babette Cole, 1993) give much opportunity for children to develop fantasies about sexuality and birth before giving them appropriate knowledge. In these books, there are fantasies that even children cannot think about. If a fantasy is stimulated positively, children's capability of sympathy can be raised. Furthermore, by giving a clear expression to fantasies held only vaguely by children, it is possible for them to express their fantasies which otherwise would be repressed in their mind. With the latter picture-book, the setup is especially interesting. This "conversed" tale starts from the place where parents try to teach their son and daughter "how babies can be made". But what parents teach them are fabrications of the kind, which are supposed to be held by children who are completely ignorant about sex. The Children heard their parents' story only to be amazed. Then the children who have comparatively right knowledge about reproduction educate their parents. With this picture-book, the idea that "adults are not necessarily right" is given to readers. Moreover, this book humorously tells children that adults themselves have conflicts about sex education.

It is true that books like these are relatively few compared to those that focus on scientific knowledge. Surely, in order to accept the request of the educational side, the picture book written in a scientific light is more acceptable for educators in the end. But from a psychoanalytic point of view, it is reasonable to suppose that, picture books that respect children's questions and fantasies should be introduced before giving them scientific knowledge. Introducing these books in sex education may deter the transfer of scientific knowledge for a certain period. However, it must not be forgotten that small children are

not "small adults" but human beings who hold their own thoughts. Moreover, as the quotation of Freud about the results of sex education and Klein's observation on Fritz mentioned previously showed, for children any scientific explanation is no more than one story among the many they create in their fantasies.

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DEVELOPMENT OF PARENTAL AVERSION TO OFFSPRING'S BODILY PRODUCTS: A NEW APPROACH TO PARENT-OFFSPRING RELATIONSHIPS

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Abstract

Child custody includes elimination of bodily products from children's bodies although some products may result in negative feelings by caregivers, and aversion to older children's bodily products may be stronger. This study aims at examining the development of parent-offspring relationships through such aversions. Parents of infants (4.0±1.1 months), kindergarteners (3.6±0.6 years), and undergraduate students (20.8±1.4 years) completed a questionnaire about the intensity of their aversion to bodily products (saliva, feces, fallen hair, nose dirt, phlegm, blood, urine, nail parings, scabs, grime, pus) of their offspring, of their own, and of others by imagining hand contact with each of them. The subjects were 25, 65, and 79 fathers and 36, 90, and 89 mothers for the three age groups, respectively. Results indicate that the products of students were far more disliked than those of young children. Aversion was significantly stronger in parents of kindergarteners than of infants toward feces, nose dirt, phlegm, and urine. It is notable that products of infants were significantly more acceptable for parents than those of their own, except for blood, nail parings, and scabs. Such acceptability decreased abruptly for kindergarteners. Products of students were conversely more disliked than the parents' own, except for feces. Nevertheless, it was still far more acceptable than products of other persons. Differences due to the sex of both parents and the offspring, or the offspring's birth order, were almost negligible in any age group. Thus, bodily products of offspring are considered to significantly mediate their relations with parents.

Key Words: parent-offspring relationship, aversion toward bodily products of offspring, infants, weaning, maturation

Introduction

Parent-offspring relations are regulated not only psychologically but also physically, and the offspring's physical body is a significant determinant of parental behaviors. Appearance of infants, for example, is a cue for parents to enhance their care and protection (Alley, 1980, 1981, 1983; McCabe, 1984).

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However, effects of the offspring's body on parental care are not always positive. Offspring's bodies produce various things such as feces, urine, and grime as a result of metabolism. Parents have an aversion to at least some of these bodily products even if they are produced from their own bodies, and products of other persons normally cause much stronger avoidance response.

Custody of offspring includes, as a necessary component, elimination of bodily products from offspring body surface or place around them (e.g., Lombardo, 1991). Thus, it seems adaptive for negative feelings to be suppressed in parents when taking care of young offspring.

Trivers (1974) suggested that conflict is a necessary component of a relationship between mother and offspring at certain stage of the offspring's development. The above-mentioned negative feelings for offspring by their parents may be related with conflict and hypothesized to increase with the offspring's age. In this sense, aversion by parents toward offspring's bodily products may be considered as one of the strong indicators of the developmental changes in parent-offspring relationship.

The present study aims at measuring the development of mutual independence between parents and offspring by comparing parents' aversions to various bodily products of offspring in three age groups-infants, kindergarteners, and undergraduate students.

Method

Participants

Parents of infants (4.0±1.1 months; 39 sons and 22 daughters, 1 sex unspecified), of kindergarteners (3.6±0.6 years; 103 sons and 53 daughters), and of undergraduate students (20.8±1.4 years; 54 sons and 114 daughters) participated in the present study (see Table 1). They were randomly sampled from a list of residents of Tokorozawa, Saitama Prefecture, and were contacted by mail, after which they agreed to participate in the study. Parents of kindergarteners and university students enrolled in private kindergartens and a private university in Tokorozawa, respectively, were asked to participate in the present study by letter. Altogether, 25, 65, and 79 fathers and 36, 90, and 89 mothers participated in the study across the three age groups, respectively.

The participants were distributed a questionnaire and asked to respond to questions about the intensity of their aversion to bodily products (e.g., saliva, feces, fallen hair, nose dirt, phlegm, blood, urine, nail parings, scabs, grime, pus, slobber; see Table 2)

Table 1 Number of parents participating in the study

Offspring		Parents		
		Fathers	Mothers	Not specified
Infants				
	Boys	15	24	0
	Girls	9	12	1
	Not specified	1	0	0
Kindergarteners				
	Boys	43	59	1
	Girls	22	31	0
Undergraduates				
	Boys	25	29	0
	Girls	54	60	0

table 2 Bodily products

Bodily products	Definition
Feces	Waste matters excreted from the bowels
Phlegm	Thick, semi-fluid substance forming on the skin of the throat, and brought up by coughing
Urine	Waste liquid which collects in the bladder and is discharged from the body
Pus	Thick yellowish-white liquid formed in and coming out from a poisoned place in the body
Grime	A coating on the body
Saliva	The natural liquid present in the mouth
Nose dirt	Semi-solid unclean matter in the nose
Fallen hair	Hair fallen off the head
Blood	(Common usage)
Slobber	Saliva running from the mouth
Scabs	Dry crust formed over a wound or sore
Nail parings	Nail cut away from the fingers

of offspring, of their own, and of others by imagining their hand in contact with each of them. The intensity of parents' feelings for each imaginary contact was recorded using a five-point rating scales (1: pleasant, 2: mildly pleasant, 3: neutral, 4: mildly unpleasant, 5: unpleasant). Parents were requested to choose for each question the most appropriate level of intensity in response to manual contact for each of the listed bodily products. The products were listed in the same order for the three different categories of each age group (i.e., offspring, own, and others) successively.

The foci of attention were on the parents' feelings toward the bodily products of their offspring in comparison with those of their own and of others, and on the differences due to the ages of offspring. Responses to products of others were collected in order to examine and clarify general aversion levels of parents to each of the bodily products. The level of statistical significance was set at 1% throughout the study.

Results

Developmental change in parental aversion

As Figures 1-3 show, parents generally had an aversion to products, and parents' aversions were strongest for products from the body of others. Levels of aversion to products of their own and those of others were constant across the three age groups. However, parents showed the least aversion to those of their offspring, with increasing dislike across age and with the highest aversion to the bodily products of undergraduates in comparison to those of themselves. The increase in parents' aversion toward the offspring's bodily products may be related with their psychological detachment from the offspring as caregivers.

Differences in parental aversion toward offspring and themselves

By comparing aversion scores by parents toward the products of the offspring and of their own, it was found that the products of infants were significantly more acceptable than those of their own, except for blood, scabs, and nail parings by t-tests (Table 3). Such acceptance decreased abruptly for kindergarteners, which reduced the differences. On the other hand, parents had greater aversion to products of undergraduates than those of the parents' own, except for feces (Table 3). This may suggest an increase in physical

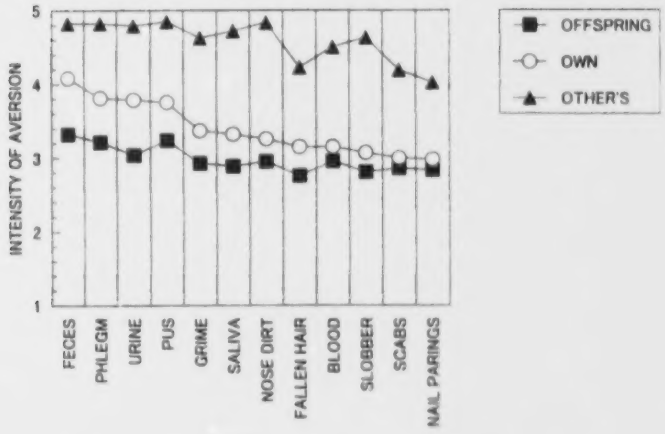

Figure 1 Parents' aversion to bodily products of infants

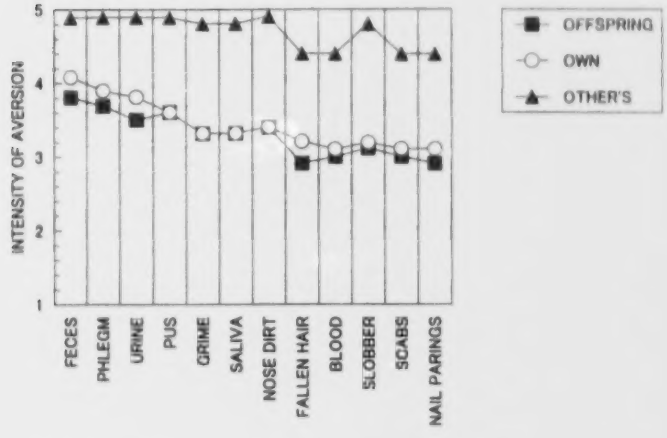

Figure 2 Parents' aversion to bodily products of kindergarteners

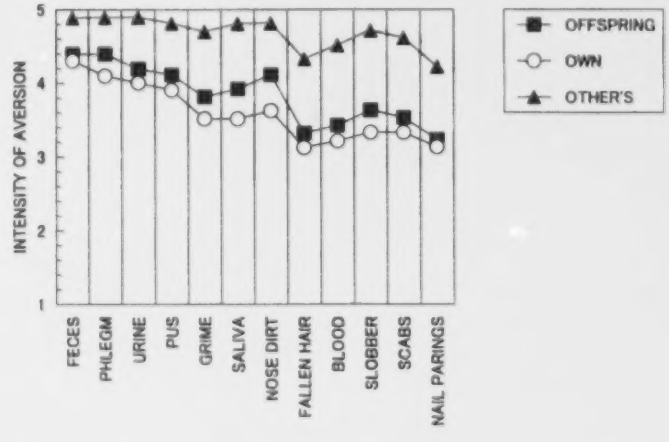

Figure 3 Parents' aversion to bodily products of undergraduates

Table 3 Significant differences in aversion scores to body products of offspring and of parents' own

	Infants	Kindergarteners	Undergraduates
Feces	Own>Offspring's	Own>Offspring's	
Phlegm	Own>Offspring's		Offspring's>Own
Urine	Own>Offspring's	Own>Offspring's	Offspring's>Own
Pus	Own>Offspring's		Offspring's>Own
Grime	Own>Offspring's		Offspring's>Own
Saliva	Own>Offspring's		Offspring's>Own
Nose dirt	Own>Offspring's		Offspring's>Own
Fallen hair	Own>Offspring's	Own>Offspring's	Offspring's>Own
Blood			Offspring's>Own
Slobber	Own>Offspring's	Own>Offspring's	Offspring's>Own
Scabs			Offspring's>Own
Nail parings		Own>Offspring's	Offspring's>Own

t-test, $P<0.01$

distancing between undergraduates and their parents in everyday life. Nevertheless, the products of undergraduates were still far more acceptable than those of others.

Aversion significantly increased between infants and kindergarteners toward feces, phlegm, urine, and nose dirt (see Table 4, Scheffe's procedure). In other words, the waste products from the offspring's intestinal, urinary and respiratory organs more easily evoked negative feelings in the parents, and, in spite of this, aversion to those products of the infants was strongly suppressed. Those of undergraduates were, without exception, more disliked than those of younger children.

Correlations in aversion between offspring and their own

The intensity of parental negative feelings toward products of offspring and of their own might be correlated. Table 5 indicates correlation coefficients between the aversion scores to the products of offspring and of their own. The results indicate that the aversion scores to the offspring's and parent's own products were all significantly correlated for

Table 4 Multiple comparison among 3 age groups

	I vs K	I vs U	K vs U
Feces	<	<	<
Phlegm	<	<	<
Urine	<	<	<
Pus		<	<
Grime		<	<
Saliva		<	<
Nose dirt	<	<	<
Fallen Hair		<	<
Blood		<	<
Slobber		<	<
Scabs		<	<
Nail parings		<	<

Scheffe's procedure, $P<0.01$
I: Infants
K: Kindergarteners
U: Undergraduates

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Table 5 Correlation coefficients of aversion scores to bodily products of children and of parents' own

	Infants		Preschoolers		Undergraduates	
	Father (N=25)	Mother (N=36)	Father (N=65)	Mother (N=90)	Father (N=79)	Mother (N=89)
Feces	0.28	−0.02	0.54	0.71	0.73	0.8
Phlegm	0.38	0.26	0.47	0.62	0.63	0.74
Urine	0.48	0.37	0.68	0.66	0.73	0.7
Pus	0.45	0.34	0.71	0.61	0.74	0.79
Grime	0.82	0.27	0.63	0.59	0.75	0.77
Saliva	0.89	0.56	0.78	0.53	0.52	0.62
Nose dirt	0.75	0.36	0.69	0.48	0.56	0.6
Fallen hair	0.82	0.46	0.63	0.4	0.52	0.68
Blood	0.63	0.6	0.69	0.49	0.7	0.77
Slobber	0.75	0.77	0.61	0.45	0.4	0.59
Scabs	0.94	0.69	0.86	0.72	0.68	0.65
Nail parings	0.93	0.65	0.81	0.68	0.71	0.65

Underlined: $P<0.01$ (Two-Tailed)

kindergarteners and for undergraduates. In contrast, infancy was unique in that there were no significant correlations for responses to feces, phlegm, urine, and pus by either parents and for grime and nose dirt among mothers.

Differences due to sex of both parents and the offspring, or the offspring's birth order, were almost negligible in any age group.

Discussion

These results strongly suggest that parents' dislikes of offspring's bodily products are weak during infancy, and increase with the offspring's development. The aversion was most remarkable for the bodily products of the offspring's intestinal, urinary and respiratory organs, in spite of those products having positive functions between mothers and infants in some mammalian species (Gubernick & Alberts, 1983; Holinka & Carlson, 1976; Horrell & Hodgson, 1992).

In the present study, parents had less aversion toward products of the infant bodies than the parents' own products. Moreover, sex of parents, and sex and birth order of offspring hardly produced significant differences, which suggests age as an outstandingly important factor in the intensity of aversion.

Nourishment by milk and/or solids is essential for the survival of offspring, and this is actualized through various interactions between offspring and their parents, which is related with mutual independence of mothers and infants (Crow, Fawcett & Wright, 1980; Negayama, 1993). Aversion by parents was most evident for feces, and they are produced out of food taken by the offspring. It is often said by mothers of weaning infants that infants'feces begins to smell bad after introduction of solids, and an unpublished study by the present author actually indicates that a sudden increase in this aversion occurs soon after introduction of solid-food. Weaning is not simply a drastic change in food but a change in offspring's behavioral autonomy and mother-offspring relationship (Martin, 1984) and, as Trivers (1974) pointed out, the relationship includes conflict between mothers and offspring. The sensory aversion examined in the present study thus seems to

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be both an outcome and a regulator of parent-offspring mutual independence, which outlines development of the relationships.

There was a big difference in the aversion between kindergarteners and undergraduates. Sexual maturation normally triggers separation between animal parents and offspring to avoid incest. This kind of separation between parents and offspring might be promoted by the parents' aversion to the bodily products of sexually matured offspring.

The bodily products of offspring are generally disliked by the parents, but nevertheless, it is also plausible that everyday contact with such products would increase the parents' feeling of responsibility for their offspring. In this sense, the bodily products of the offspring might function as an enhancer of the bond. Thus, the aversion to bodily products is of fundamental importance in understanding the development of parent-offspring relationship and the offspring's separation-individuation (Mahler & La Perriere, 1965).

In spite of these interesting suggestions, the importance of this study is limited because it focuses only on the feelings of parents as an indicator of their relations with offspring. These aversions might be connected with parents' actual interactions with offspring and the spatial distancing between them. Collecting behavioral data on parent-offspring relationships and correlating them with the development of aversions is needed in the future.

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FEEDING AS A COMMUNICATION BETWEEN MOTHER AND INFANT IN JAPAN AND SCOTLAND

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Abstract

Development of infant independence is largely based on the development of feeding, or weaning. In the feeding interactions, mothers have a strong expectation of their infants' behaviors, and the infants have desires of their own which do not always meet these expectations. Feeding is, thus, a communicative situation of control, conflict, cooperation, and/or negotiation between them, which reveals cultural fundamentals of mother-infant relationships. The present study compared mother-infant feeding interactions in Japan and Scotland. Japanese data were obtained longitudinally from 7 mother-infant dyads soon after the introduction of solids until 3 years of age or less (Studies 1 and 3), whereas Scottish data were cross-sectional with 72 dyads during 20 months postpartum (Study 3). Food was initially provided by mothers, and refusal of the passive feeding was considered a transitional behavior to autonomous eating. The Japanese infants showed refusal more frequently than the Scottish infants. Mothers were not just food providers but behaved empathetically during infant food-taking, and this tendency was more evident among Japanese mothers. Mothers in Japan often ate food left by the infants, which was not observed in Scotland. In Study 2, in order to examine the meanings of the empathetic behavior, it was observed in 21 Japanese mothers of 7-month-olds under three different experimental conditions: that is, maternal feeding, paternal feeding with mothers looking at them from 0.5 m and from 2.0 m away. The behavior was significantly more frequent when the mothers themselves fed the infants, suggesting that the behavior was an indicator of the mothers' psychological involvement in the children during the feeding situation. Motherhood and mother-infant communication in the two cultures and their possible determinants were discussed on the basis of these findings.

Key Words: mother-infant communication, solid-feeding, Japan and Scotland, weaning, empathetic behavior, refusal of passive feeding

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Introduction

Mothers and infants are considered to be in a positive relationship with mutual affection. But the development of the relationship could be considered as a process of mothers' emancipation from the burdens of infant care as well as a process of infants' achievement of autonomy. Feeding is essential to the survival of any organism, and mammalian infants have to be nourished by the caregivers. It is possible to say that the mothers of fetuses and newborns are substitute eaters of solids for them. Trivers (1974) suggested an idea of mother-offspring weaning conflict from the sociobiological viewpoint, and this could be outlined by the changes in the ways the offspring are nourished from breast milk to solids. It means a shift of responsibility and burden from mother to offspring in food-taking. Human infants are unique as a primate in being fed solids by caregivers, and, thus, normally dependent on the mothers' assistance in eating at the start of solid-feeding but soon become independent.

Ways of reducing the burden may be different in cultures with different standards for mothers' involvement in infant care. In feeding interactions, mothers have a strong expectation of their infants' behaviors based on societal customs, and infants have their own needs and wishes which do not always meet these expectations. Feeding is, thus, regarded as a communication of control, conflict, cooperation, and/or negotiation between mother and infant, which reveals the cultural fundamentals of mother-infant relationships and their development (Negayama, 1993).

Weaning processes are describable in at least 3 different ways: from the viewpoint of (1) change in the list or preference of food (e.g., Pliner, 1994; Wright, 1989); (2) change in the tool-use or eating behaviors (e.g., Connolly & Dalgeish, 1988; Norimatsu, 1993); and (3) change in communication between feeders and infants as described above. Although these are interrelated, this study focuses on the third point with an emphasis on the infants' autonomy and the mothers' empathetic nature toward their infants at the moment of feeding. Interactions between mothers and infants in the feeding situation are, thus, considered to clearly show development in the relationship, and a cross-cultural comparison highlights the significant characteristics in mother-infant relationship in each culture. However, mother-infant interactions during solid-feeding have not been focused on previously as a context of communication, and the present study is an exploratory attempt of this.

STUDY 1

As a first study, I made a naturalistic longitudinal observation of solid-feeding in the Japanese home, focusing on the development of self-feeding in the normative feeding interactions. Details of the study are reported elsewhere (Negayama, 1993), and a brief summary is provided to facilitate making cross-cultural comparisons in Study 3.

Participants were 7 Japanese mothers and their infants, who were living in the urban area of Hyogo or Osaka Prefecture and had agreed to participate in the observational study of solid feeding in the home. Behaviors of the seven dyads during spontaneous solid-feeding were videotaped from its beginning to the end in the home once or twice a month with a Sony video camcorder. The time of start and end of feeding was decided by the mothers. The study was started soon after an introduction of solids, and ended at various

times before 3 years of age. Data are shown here only until 20 months because of a decrease in participants. Both mothers and infants were targets of the observation. The mothers were instructed to ignore the observer, and the situation was kept as natural as possible. When infants were distracted by the observer, the observer hid himself in order to remove himself from the situation. Data were analyzed with 1/0 sampling with 5-second intervals, and the results are shown as percentage ratios.

Figure 1 shows a shift in the ways of food-taking by the infants. The data were shown as median values of 7 dyads for each age block. Solids were introduced and provided totally by mothers in the first stage of weaning at about 5 months, and at about 1 year of age the infants began to take food by themselves mainly with their own hands. Self-feeding with utensils began after one year of age, but was not very frequent yet at 18-20 months of age.

In the period of transition from passive to self-feeding, cooperative interactions between mothers and infants were often observed. For example, the infants actively pulled on the utensils with which mothers were feeding, or took food by hand from utensils being offered by the mothers. However, the feeding interactions were not always positive, and the infants often showed refusal in response to maternal feeding attempts. This behavior included active rejection and a mere closure of the mouth to show their unwillingness to take the food. The behavior increased steadily with age as Figure 2 shows. The behavior suggests a presence of disagreement in motivation of feeding between mothers and infants, indicating growth of the infants' autonomy in eating solids. Infants sometimes fed mothers in a playful context after 1 year, and this also indicates their increased partnership with their mother in feeding at this stage.

Mothers very often showed an empathetic eating-like mouth behavior just when infants took food or soon after. This empathetic behavior was actually a reflection of the infants' eating. In other words, the mothers fed the infants and at the same time behaved as if they were fed. The infants did not always look at the mothers at the moment of the occurrence. The behavior, therefore, seemed to indicate the mothers' sharing of the same psychological states with the infants rather than intentionally guiding the infants to take food. This behavior is of extreme importance in viewing feeding as a communication, because this formed a psychological context for communication between mothers and

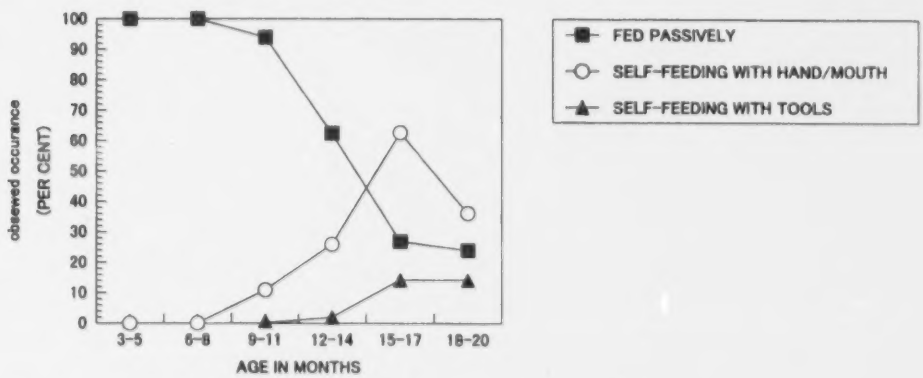

Figure 1 Ways of feeding in Japanese children.

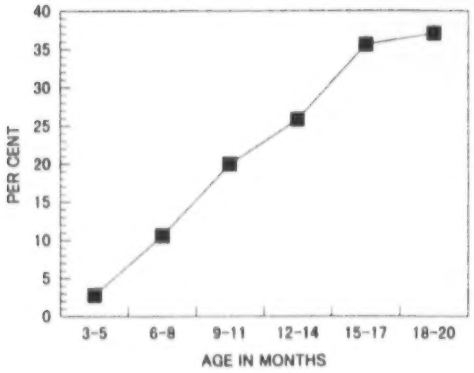

Figure 2 Percentage of occurrences of child refusal of food to mothers' feeding attempt.

infants.

As Figure 3 shows, the behavior was initially not very frequent, then increased rapidly, and decreased after 1 year. This change in behavior represents the mothers' once becoming highly empathetic to the infants and then reducing their empathy to infants in this situation. This strongly suggests a change in the mothers' expectation for the infants' eating.

Mothers in Japan often ate food or food particles left by the infants, which was almost never observed in Scotland with an exception of auto-licking of feeding fingers. Japanese mothers were also different from Scottish mothers in sharing their own food with infants.

STUDY 2

Study 1 gave a general picture of development in feeding interactions between Japanese mothers and infants. In Study 1, an importance of infant refusal and maternal empathetic behavior was pointed out in order to understand the interactions as communication between the two partners. The empathetic behavior could be interpreted to reflect the mothers' expectation towards the infants' active participation in eating, and therefore

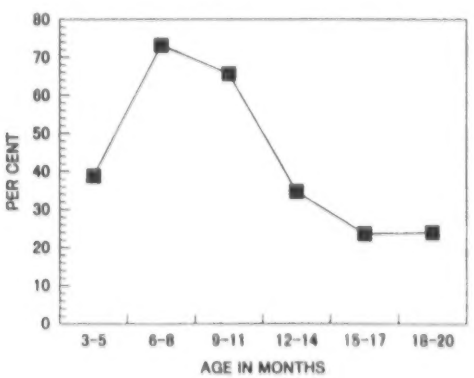

Figure 3 Percentage of occurrences of mothers' empathetic behavior to infants' feeding.

their psychological involvement in the interaction. The behavior is especially interesting when regarding feeding as communication because of its intersubjective nature. In Study 2, then, an experimental situation was supplementarily set up to determine the psychological state of mothers showing these empathic behaviors.

Participants of Study 2 were 21 Japanese mother-offspring pairs at the age of 7 months when occurrences of empathetic behavior was at its peak in Study 1. They voluntarily agreed to participate in the study. The experiment was carried out during normal feeding in the home, and empathetic behavior of the mothers was videotaped and compared in 3 different situations: (1) when they fed the infants; (2) when they just watched the infants being fed by fathers at about 0.5 m (NEAR); and (3) at about 2.0 m, away from the infants (FAR). The mother, the father, and the infant were positioned in a v-shape with the infant at the center, and the angles made by the parents to the infants were kept as consistent as possible. The infants were fed 10 times for each condition with a random order given by the experimenter.

Figure 4 shows average ratios of the mothers showing the empathic behavior at the moment of the infants' eating for each condition and indicates that the behavior was most frequent when the mothers themselves were the feeders. When the fathers fed, the behavior still occurred in the mothers but was significantly less frequent (Wilcoxon test). The difference in the occurrences between the NEAR and FAR conditions was not significant. This result strongly suggests that the empathic behavior was an indicator of the mothers' psychological involvement in the interactions as stated above. In other words, it suggests that mothers of Study 1 attended less to infants' feeding after one year of age, probably because of an increase in the infants' autonomy in eating.

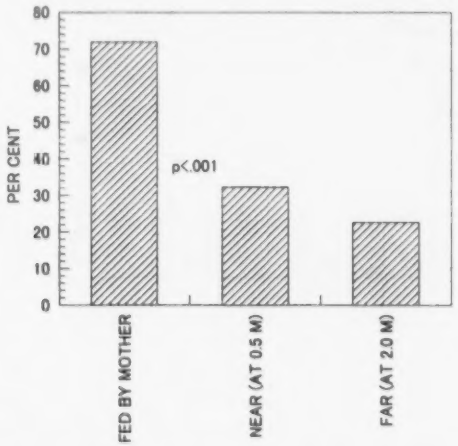

Figure 4 Mothers' empathetic behavior under three different conditions of child feeding.

STUDY 3

Feeding interactions between mothers and infants were observed in the Scottish home and were compared with the behaviors of Japanese dyads. The Japanese data shown below are the repetition of Study 1. The methods of data collection in Japan and Scotland

were not identical: Japanese data (Study 1) were longitudinal as shown above, and the Scottish data were cross-sectional with 12 dyads for each 3-month age block between 3 and 20 months of age, with 72 dyads in total (3 first-born and 3 later-born boys, and 3 first-born and 3 later-born girls, for each age block). The Scottish mothers and infants were all recruited in Edinburgh, and were all voluntary participants to the study as in Japan. Observations with a Sony video camcorder and analyses of the tapes in the two studies were both done by the same person (the author). As in Study 1, they were observed during normal feeding in the home with minimum intervention. The data were shown as median values for each country, and statistical significance in the differences between the two countries was tested by Mann-Whitney U test.

Before proceeding to the observational data of feeding, an interview data from 27 Japanese and 100 Scottish mothers on the age of introducing food other than milk is shown in Figure 5. The figure indicates the number of mothers introducing solids for each age, showing that the Scottish mothers were a little earlier in the introduction.

Returning to the observational data, the mothers' empathetic behavior is shown in Figure 6. Scottish mothers also showed this behavior, but it was generally less frequent than in Japan. This means that the Japanese mothers were more involved in the feeding situation than the Scottish mothers. Communication in feeding, thus, looked more

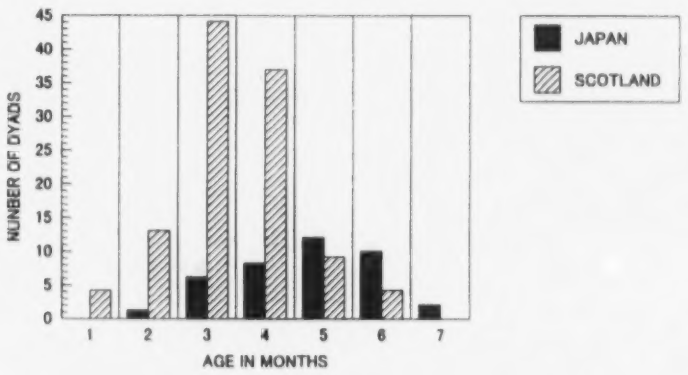

Figure 5 Ages of introduction of foods other than milk.

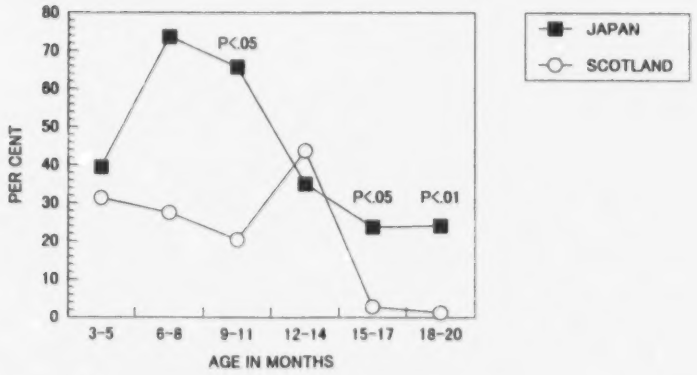

Figure 6 Empathetic behavior in Japanese and Scottish mothers.

empathetic toward their infants among the Japanese mothers. In Scotland, empathic behaviors did not increase in the later half of the first year and gradually reduced in frequency.

Japanese mothers' stronger involvement in infant feeding was related to the higher occurrences for the Japanese infants to be passively fed by the mothers (Figure 7). The Scottish infants, in contrast, showed slightly more self-feeding with hand/mouth than the Japanese infants in the middle stage (Figure 8). And the Scottish mothers reduced their attempts to feed infants by bringing food to the infants' mouths in the second year (Figure 9). Thus, Japanese mothers were involved in the situation and motivated to feed their infants more strongly than Scottish mothers, and these tendencies of the mothers were related with the infants' passivity in eating solids. This difference was more evident in the second year of the infants' life.

However, as stated above, the Japanese infants were not simply passive eaters but actively responded with a refusal to the mothers' highly motivated feeding attempt (Figure 10). This was thought to be the Japanese infants' regulation of weaning to discourage the mothers' excessive motivation to feed them as caregivers.

In taking all these results together, the Scottish mothers were inclined to start and end weaning earlier with an expectation of the infants' earlier autonomy, whereas the

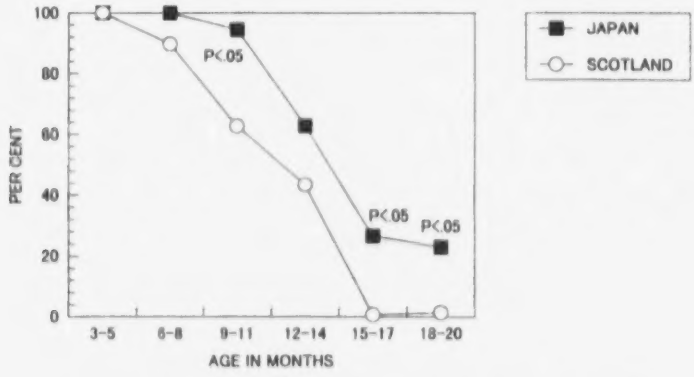

Figure 7 Passive feeding in Japanese and Scottish children.

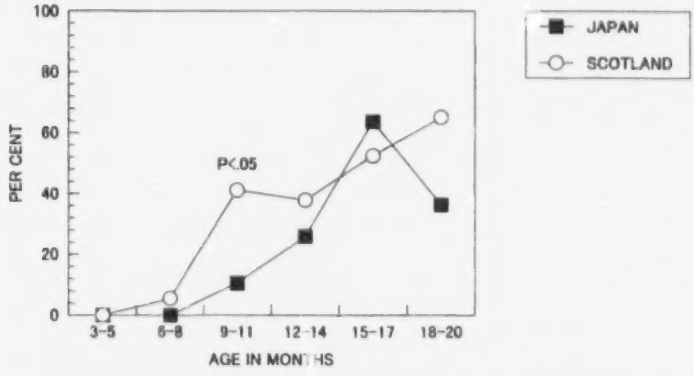

Figure 8 Self-feeding with hand/mouth in Japanese and Scottish children.

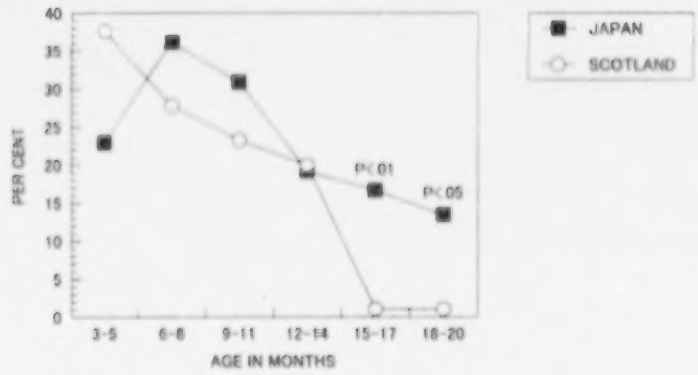

Figure 9 Feeding attempt in Japanese and Scottish mothers.

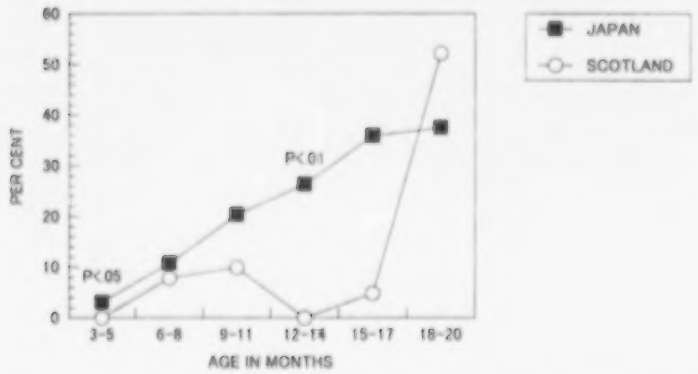

Figure 10 Child refusal of food to mothers' feeding attempt in Japan and Scotland.

Japanese mothers wanted to keep their role as active caregivers longer. Thus, observing mother-infant interactions in the feeding situation was very effective in describing their relationship and its development, and cross-cultural differences.

Discussion

Feeding is an everyday situation where both positive and negative interactions take place between feeders and recipients and is very important for children to learn a communication standard of the culture. Interactions in weaning outline early mother-offspring relationship.

From the Japanese data of Studies 1 and 2, infants were initially fed solids passively by their mothers, then began to feed themselves mostly with hands after 1 year of age. When infants changed from passive to active eaters, mothers and infants became cooperative in their feeding. However, infants also showed refusal to the mothers' feeding attempt, and it increased steadily with infants' age, showing an increase in their autonomy. Mothers' empathetic eating-like mouth behavior at infants' food-taking once increased in the first year, and then decreased, which seemed to reflect the mothers' psychological involvement at feeding. Stronger maternal empathy in Japan was also suggested by their ambiguity in food belongingness and higher sharing of them.

Feeding interactions from the Scottish data in Study 3 also indicates the development in communication between mothers and infants and in the infants' autonomy. However, the Scottish mothers were less involved in the infant feeding or less empathetic as shown in the mothers' less frequent empathetic behavior and feeding attempts than in Japan. The Scottish infants were less frequent in being fed passively and in food refusal, and slightly more frequent in self-feeding than the Japanese infants.

Infants of both countries were, thus, fed passively in the beginning, and then began to self-feed mainly by hand and then by utensils. The weaning interactions observed here did not show any active rejection by the mothers to promote the offspring's weaning as Trivers (1974) assumed. The infants were initially obedient to the mothers' regulation, but they gradually became autonomous in the situation by active cooperative participation as partners and/or by refusal which was more evident in the Japanese dyads, and they achieved considerable independence in feeding by one and a half years of age.

The Scottish mothers were more inclined to take leadership to promote feeding independence whereas the Japanese mothers were highly motivated to feed their infants for a prolonged period with stronger involvement and empathy toward their own infants. When mothers showed empathetic behavior during infant eating, infants perceived this behavior with their own, making the infant eating situation a highly intersubjective experience. Repetition of this experience as communication between mothers and infants every day as well as interdependence in the Japanese mother-toddler dyads (Messinger & Freedman, 1992) may foster a sense of 'oneness' with the mothers in the infants.

However, at the same time, Japanese infants' refusal of maternal attempts during feeding worked to regulate the relationship from the infant side. This seems to be an active role played by the infants to lead the course of feeding independence within a certain adaptive range by limiting an effect of the mothers' excessive involvement.

To sum up, the characteristics of communication in the feeding interactions between the Japanese mothers and infants indicate the Japanese mothers' strong motivation to help or facilitate the infants as well as an important active role of the infants as regulators in the process of weaning. In Scotland, on the contrary, the mothers had stronger leadership to induce the infants' earlier feeding autonomy, and the infants conformed to it. This kind of nonverbal communication resulted in earlier independence among the Scottish infants' solid-feeding in comparison with Japanese infants. It appears to be a part of cultural transmission of self-other relationship patterns (e.g., individualism vs. collectivism; Fijneman et al., 1996) from parent to offspring.

Such different combinations of the mother-infant behavioral systems between Japan and Scotland suggests a complementary relationship between mother and infant to keep the weaning processes from deviating from a normal range. From the general systems perspective (Marvin, 1997), this cooperation of mothers and infants is important to the infants' appropriate development, and cultural differences exist in the different proportions of initiatives taken by the mothers and infants.

In the present study, Scottish mothers were less enthusiastic in feeding and their infants ate solids more autonomously in the first year of age than in Japan. However, Norimatsu (1993) reported a little different picture among French children in public day care centers. Feeding development is actually determined by a combination of multiple

factors of the societal custom or norm and the equipments, the parents' expectations or attitude as caregivers and their decision of care-taking practices as well as their employment, the offspring's reactions to the practice, and so on. The present study focused on the parent-offspring communicative interactions in the course of weaning of the two cultures, but the interactions also may have been correlated with physical aspects of feeding such as foods and the utensils given to the infants. Further analyses are needed to examine effects of those physical determinants in order to get a more general ecological view of the feeding development.

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TANSHINFUNIN : EFFECTS OF FATHER ABSENCE ON CHILDREN'S SOCIOEMOTIONAL DEVELOPMENT

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Abstract

Tanshinfunin, men's job relocation without being accompanied by their families, is one of the specific social phenomena impacting on fathering in Japan. This study examined the effects of the fathers' tanshinfunin on their children's socio-emotional development in comparison with children of fathers whose job relocation was accompanied with their families (Taidofunin). Conducting a follow up study after five years, this study also examined the long-termed effects of tanshinfunin. The fathers' physical absence did not have so much of a direct negative effects on their children's socio-emotional development, but the physical absense in addition to functional absense seemed to result in negative effects. The follow-up after five years indicated that fathers' long term absense weaken family integration and had negative effcts on children's stress-coping.

Key Words: father absence, job-related transfer, tanshinfunin, children's socio-emotional development, family mental health

INTRODUCTION

The role of the father in a family

The importance of the father in the development of his children has been the topic of many sociological, psychological studies(Lamb, 1986, 1987, 1997). Among the many social changes brought about by economic development, tanshinfunin, or men's job relocation without being accompanied by their families, has been an important factor in taking the fathers away from modern Japanese family life, and as a consequence, further weakening the fathers' role in the socio-emotional development of their children. In this study, we focused on the effects of father absence on the child's socio-emotional development.

Father absence can be caused by the death, divorce, and job requirement of the fathers. As the reason for the absence of father in Tanshinfunin is different from other forms of father absence, it is assumed that its effect would be different on the members of the family.

In previous studies, the effects of father absence on child's socio-emotional development have been examined from four aspects: sex role, personality-social, moral, and intellectual development. The following are the summaries of two review papers addressing this issue (Furuichi, 1978; Lamb, 1981).

(1) Sex role development: Boys who lose their father under 6 years old are less masculine than boys whose fathers are present. However, girls show no such differences.

(2) Personality-social development: Father absent boys are either less aggressive or hyperaggressive (overcompensation).

(3) Moral development: Father absent boys show lower moral development. The percentage of juvenile delinquent boys who lose their father under 6 years old is high.

(4) Intellectual development: Father absent boys show lower math ability.

These results examined the effects of father abscence from the point of view of direct effect of father absence as the loss of male model. However, there are also indirect effect, mediated by mother's behavior and presence or absence of other male models such as male siblings, uncle and so on. We would look into these aspects.

Tanshinfunin : Father absence in Japan

One of the social conditions impacting on fathering in Japan is the increasing tendency for middle-aged company men to be dispatched to places away from their families for extended period of time. Under this condition, many married men have to live by themselves away from their families in different town or city for various length of time, ranging from one to several years. This practice, called "Tanshinfunin", has become very common since 70's. According to the survey of the Ministry of Labor of Japan about 20% of new transferees are Tanshinfunin, and the percentage of Tanshinfunin has been increasing in recent years (Figure 1, Tanaka, 1992).

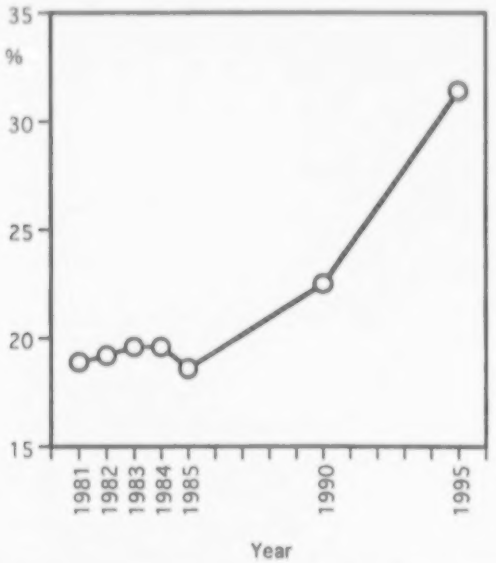

Figure 1 Percentage of Tanshinfunin in New Transfees. (Ministry of Labor; Tanaka, 1992)

In many instances, families are hesitant to move their children to a new school district, due to the great urgency associated with academic success and children's reluctance to leave their classmates and friends. In addition, owing to the general shortage of housing facilities and therefore the high cost for residence in Japan, it is impractical financially to obtain a second house large enough for the family when job requirement demands relocation to a new town or city. As a result, many company men leave their families behind and move to the new location alone (Shwalb, Imaizumi, & Nakazawa, 1987).

Our data from 1990-1995

There are studies that examined the Tanshinfunin men's psychological stress and its impact on their families (Tanaka, 1988). However, most of these studies addressed their questions to the Tanshinfunin men and their wives only but not to their children directly. The influence of the practice on their children's development was inferred from answers derived from the adults. It is our view that research taping the children's voice is required to reveal the true effects of their fathers' Tansinfunin on their development.

This study examined the children's socio-emotional problems of Tansinfunin men by comparing social-emotional problems of children whose fathers move to their new job location with their families. This latter practice is known as Taidofunin, arriving at one's new post with the family. This study also examined the effects of long term Tanshinfunin on children's socio-emotional development.

METHOD

Subjects

(1) Original survey at 1990:

Subjects were Japanese children from Tanshinfunin and Taidofunin families. Their age ranged from 11 years (Grade 5) to 18 years (high school). 229 children were from Tanshinfunin families (mean age 14.2); and 180 children were from Taidofunin families (mean age 13.8). Subjects were recruited by newspaper ads.

(2) Follow-up survey at 1995:

Five years after the original survey, a follow-up survey was carried out. We managed to obtain information from 75 children from Tanshinfunin families, and 41 children from Taidofunin families. Children from Tanshinfunin families were divided to two groups: the Prolonged Tanshinfunin group(n=26) whose fathers were still living apart from their families, and the Rejoined group(n=49) whose fathers terms for Tanshinfunin had ended and fathers were living with their families.

Questionnaire

Questionnaire, designed to find out about social norm, stress symptom, cognition of parents, and changes in family atmosphere, was used in these two surveys.

RESULT

Principal component factor analyses with Varimax rotation on each variable were conducted. A 2 (father's relocation type: Tanshinfunin or Taidofunin) x 3 (subject age: Elementary, Junior High or Senior High) x 2 (gender of subjects: Boy or Girl)

ANOVAs was performed on these factor scores in the first survey.

In addition, a 3 (father's relocation type: Taidofunin, Prolonged Tanshinfunin, or Rejoin) x 4 (subject's age : Junior High, Senior High, College or over) ANOVAs on these factor scores in the follow-up survey.

The original survey of 1990 (Nakazawa, Nakazawa, & Tanaka, 1992)

Table 1 summarized the results of the original survey. We selected only results with statistic significance with regard to the relocation type.

With respect to Social Norm, the degree to which Tanshinfunin children permit early delinquent behavior such as smoking, drinking, truancy, was grater than that of the Taidofunin children. A Relocation type x Gender interaction was also found. Among Tanshinfunin subjects, the degree to which boys permit early delinquent behaviors was greater than that of the girls, while among Taidofunin subjects, there were no gender difference (Figure 2). A Relocation type x Subject Age interaction was found, while Junior High Tanshinfunin children showed greater tolerance of interpersonal problem behavior such as not complying with parents and teachers, quarrelling and fighting with peers, not such relocation type differences in elementary and senior high school children were found.

With regard to Stress Symptom, Taidofunin children were found to feel greater loneliness (eg. 'I feel lonely.', or 'I think I am alone.') than Tanshinfunin children.

Relocation type x Subject Age interaction showed Taidofunin elementary school children perceived their health condition more negatively (eg. 'I am tired all the time.', or 'I have lost appetite.') than Tanshinfunin elementary children, but no difference was

Table 1 Summary Results of Original Survey

	Relocation Type	Subject Age	Gender
Social Norm			
Early Delinquent Behavior	Boy: Tanshin > Taido, Girl: ns	EL < JH < SH	
Interpersonal Problem Behavior	JH: Tanshin > Taido, EL, SH: ns	EL < JH < SH	
Social Rule Deviation			Boy > Girl
Psychological Stress			
Anxiety		EL < JH = SH	
Irritation		EL < JH = SH	
Loneliness	Tanshin < Taido	EL < SH	
Unstableness			Boy > Girl
Physical Fatigue	EL: Tanshin < Taido, JH, SH: ns		Boy > Girl
Cognition of Parents			
Father			
Strictness		EL < JH = SH	
Acceptance	Tanshin > Taido		
Reliable Worker			
Lax		EL < JH = SH	
Mother			
Strictness			
Acceptance	EL: Tanshin < Taido, SH: Tanshin > Taido	EL > SH	
Lax			
Family Change			
Positive Change	Tanshin > Taido		
Negative Change	Tanshin > Taido		
Family Role	Tanshin > Taido	EL < SH	Boy >Girl

EL: Elementary School Children, JH: Junior High School Children, SH: Senior High School Children

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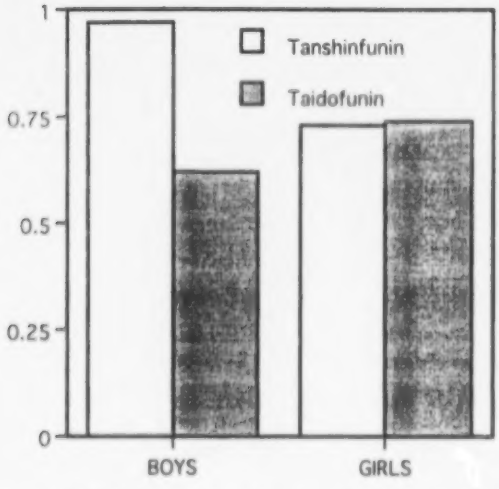

Figure 2 Children's permission about early delinquent behavior.

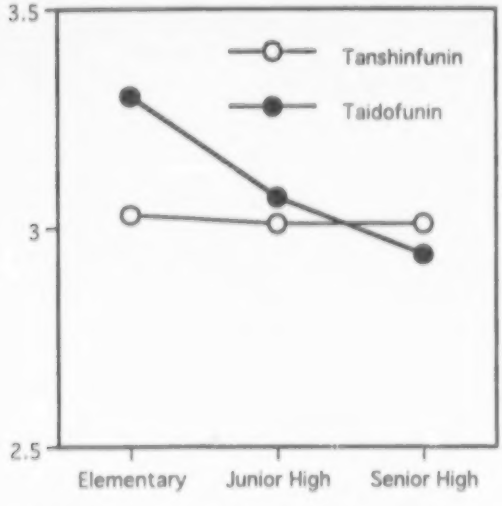

Figure 3 Children's acceptance of mother.

found between those two groups in junior and senior high school children.

In Cognition of Father, Tanshinfunin children tended to perceive their fathers as more acceptable (eg. 'I find it easy to talk to my father.', 'My father understands me.') than Taidofunin children.

In Cognition of Mother, no developmental change in Tanshinfunin children was found, whereas Taidofunin children's acceptance of mother (eg. 'I feel easy to talk to my mother.', 'My mother understands me.') decreased with age (Figure 3).

In Family Change, Tanshinfunin children perceived their family changed positively ('I talk with mother and father more than before.', 'My mother can rely on me.') as well as negatively ('My family became gloomy.', 'Minds and behaviors of my family members became scattered.') greater than Taidofunin children. Tanshinfunin children's family

role ('Role assignment to each family member is increasing.', 'I became more able to help with household affairs.') was also greater than that of Taidofunin children.

Follow Up Survey at 1995

Table 2 summarized the results of the follow-up study of 1995. We also selected only 'significant results' in relation to relocation grouping.

In Social Norm, there was no difference among the groups.

In Stress Symptom, A Group x Subjects Age interaction was found: Prolonged group felt more languor/loneliness (eg. 'I feel monotonous every day.', 'I have nothing to live for.', 'I think I am alone.', 'I feel lonely.') with age; Rejoined group felt it less with age. There was not so much developmental change in Taidofunin group (Figure 4).

In regard to Cognition of Father, no difference among groups was found.

In regard to Cognition of Mother, junior high school children and college/university students of the Rejoined group perceived their mothers as reliable workers(eg. 'She sets everything right.', 'She works hard.').

In Family Change, Rejoined children perceived their family a undergoing negative change (eg. 'My family becomes gloomy.', 'Minds and behaviors of my family members becomes scattered.') less than the other two groups. Rejoined college students perceived their families as loosening/freely change (eg. 'My family becomes behave freely.',

Table 2 Summary Results of Follow Up Survey

	Relocation Type	Subject Age
Social Norm		
Adult Norm		JH >SH > CS > W
General Norm		JH >SH = CS = W
Psychological Health		
Stress		
Physical Fatigue		JH =SH > CS < W
Languor/Loneliness	W: Rejoin < Prolonged > Taido	JH =SH = CS < W
Lack of Self Efficacy		
Unstableness		
Irritation		JH= SH > CS < W
Cognition of Parents		
Father		
Acceptance		JH =SH < CS > W
Reliable Worker		
Strictness		
Lax		
Mother		
Acceptance		JH =SH < CS > W
Strictness		
Reliable Worker	JH, CS: Rejoin > Prolonged = Taido	
Lax		JH =SH > CS < W
Family Change		
Positive Change		
Negative Change	Rejoin < Prolonged > Taido	
Loosing/Freely Change	CS: Rejoin < Prolonged = Taido	
Family Role		

JH: Junior High School Children, SH: Senior High School Children, CS: College and University Student Children, W: Working Children

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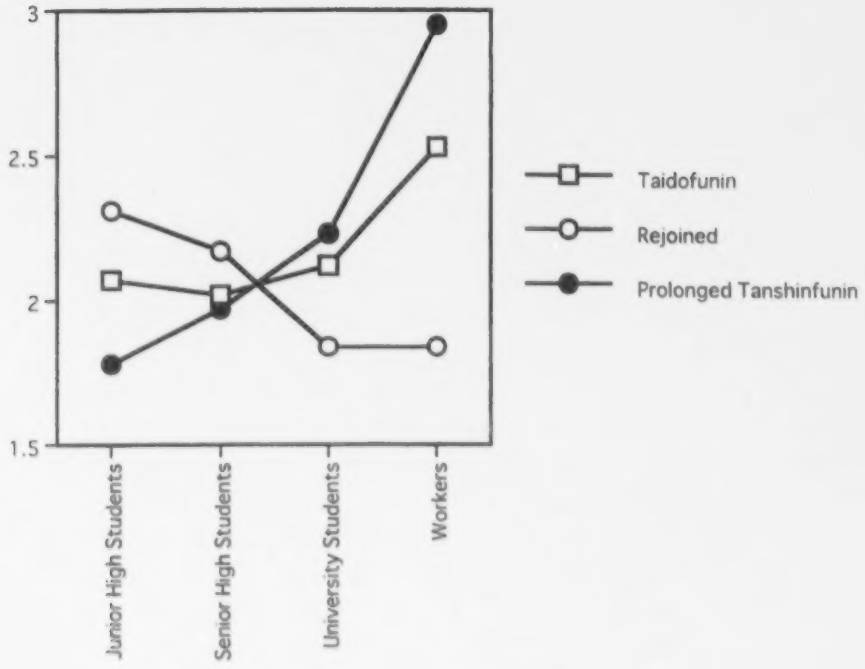

Figure 4 Children's perceived languor/loneliness.

'Behaviors of my family members becomes loosening.') less than another two groups.

DISCUSSION

Original Survey

Tanshinfunin children, especially boys, permitted early delinquent behavior and junior high Tanshinfunin children showed greater permission of interpersonal problem behavior. It showed when fathers living apart, children's social norm turn to deviate. These data are accord with former father absence studies.

Tanshinfunin children perceived their fathers as acceptable. When Tanshinfunin fathers go back to home they may accept what their children do and say.

Tanshinfunin families showed positive or negative atmosphere change and increase of family member's role. Tanshinfunin caused coping behavior of families such as positive change and increasing family role, but it also caused negative change of family atomosphere and deviation of children's social norm.

Taidofunin children feel loneliness and Taidofunin elementary school children feel physical condition badly. Because their family moved to new town, they have to adjust new environment, new school, new friend and so on. It is very stressful events for them.

Taidofunin children also want their mothers to concern about them. It showed mother-child relationships in Taidofunin family is weaker than that of Tanshinfunin family's. It is said that there are different effects of father's relocation type on their children's psychological problems.

Follow Up Survey

Prolonged Tanshinfunin family children feel languor/lonliness and perceived their family bad change with age. When children became later adolescent and get their job, each family member behaves his/her own schedule and their family become to lose unity. It caused the difficulty of dependence and made them feel languor/lonliness.

Rejoined family children perceived their mothers as reliable worker. It may because their mothers protected and maintained their home/family while fathers were out. In this group, college students perceived their family as least loosing/freely change, and workers feels the least languor/ lonliness. Father's back may reestablish in family order, repressed loosing, and make family cohesiveness.

There were not specific features of Taidofunin children. As they have lived same place more than 5 years, they almost adjusted their situation.

Japanese Father Absence

(1) Effects of the Tanshinfunin on children

The number of significant developmental effects are greater than that of father's relocation effects. Tanshinfunin dose not have disruptive father absence effect as Western studies reviewed before(Furuich, 1978; Lamb, 1981). There are two reasons.

First, comparing Western father absent studies derived from death and divorce, Tanshinfunin is a relatively slight father absence. In Tanshinfunin, most of children are over 6 years old, usually over junior high students. Children can meet their father regularly and talk with him easily by phone. The term of Tanshinfunin is usually 3-5 years. Even children participate the decision process of choosing Tanshinfunin. Family economical condition is relatively stable. Usually Tanshinfunin leads father's promotion in the company. These futures are differ from father absence by divorce or death.

Second, Japanese family relationships differ from that of Western's. In Japan, family managed child centered. Parent-child relationship regards more important than husband-wife relationship. Mother-child relationship also regards more important than father-child relationship. Thus, father's physical absence dose not have heavy negative effect on children.

(2) Comparison with Western temporary father absence studies.

There are some Western studies that examine the effect of work related father absence. In these studies, temporary/intermittent father absence in military and petroleum worker's family is examined. For example, Hiew(1992) found military father's absent adolescent children used inappropriate coping with increased risk for delinquent activities and poorer school adjustment.

Comparing these Western temporary absence studies, our subjects had not so much negative effect of Tanshinfunin. Japanese family is daily managed like father absence. Long distant commuting father, workaholic father, and fixed gender role(Male-working, Female-child rearing) is daily pictures in Japanese family. There are not so much differences between Tanshinfunin families and non-Tanshinfunin families. That is another reason, we cannot find heavy negative Tanshinfunin effects.

(3) Excessive pressure for mothers about child rearing

As the results of regarding mother-child relationship, Japanese mothers experienced

excessive social pressure about child rearing. Tanaka, Nakazawa, & Nakazawa(1993, 1994, 1996) found the Tanshinfunin mothers' child care anxiety accounted for twice as much variance in their stress reaction, compared with Taidofunin mothers'. Tanshinfunin child's early delinquent behavior influenced their mothers' child care anxiety and stress. In addition, Tanshinfunin mothers recognized that their spouse's father/husband role performance affected children's problem behavior and her stress.

These data suggest that physical father absence dose not have so much of a direct negative effect on their families' well-being, but physical absence in addition to functional absence lead to more child's problem behavior, and mother's child-care anxiety or negative stress.

In nuclear family, mothers who have not any social support, experienced much stress and child rearing anxiety. It is difficult to depend traditional community support systems, because they have already broken.

(4) Prolonged Tanshinfunin and functional defect of family

However there are not so many negative effects of Tanshinfunin, five years follow-up suggest prolonged Tanshinfunin lead adolescent workers' stress response. Long term fathers absence may weaken family integration and family function such as mutual psychological support.

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